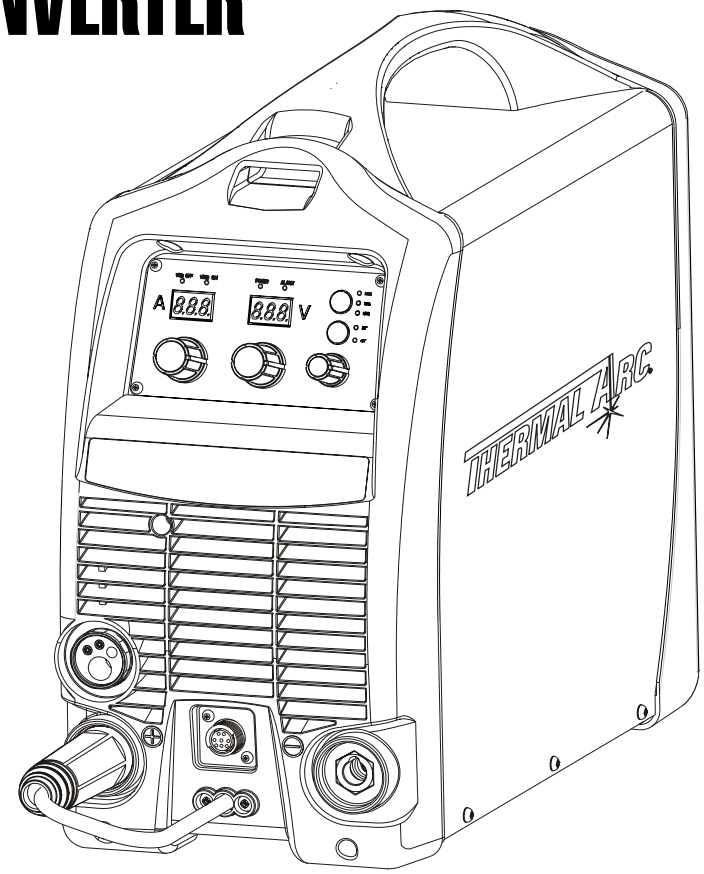
THERMAL ARC®

181i

FABRICATOR

MULTI PROCESS WELDING

INVERTER



Art # A-10107

Service Manual

Revision: AB **Issue Date:** April 06, 2012 **Manual No.:** 0-5152

Operating Features:

INVERTER | GMAW FCAW | GTAW | MMAW | 180 AMP | CC CV | DC | 230 V | 1 PHASE

RoHS CE

WE APPRECIATE YOUR BUSINESS!

Congratulations on your new Thermal Arc product. We are proud to have you as our customer and will strive to provide you with the best service and reliability in the industry. This product is backed by our extensive warranty and world-wide service network. To locate your nearest distributor or service agency call +44 (0) 1257 261 755, or visit us on the web at www.Thermalarc.com.

This Service Manual has been designed to instruct you on the correct use and operation of your Thermal Arc product. Your satisfaction with this product and its safe operation is our ultimate concern. Therefore please take the time to read the entire manual, especially the Safety Precautions. They will help you to avoid potential hazards that may exist when working with this product. We have made every effort to provide you with accurate instructions, drawings, and photographs of the product(s) we used when writing this manual. However errors do occur and we apologize if there are any contained in this manual.

Due to our constant effort to bring you the best products, we may make an improvement that does not get reflected in the manual. If you are ever in doubt about what you see or read in this manual with the product you received, then check for a newer version of the manual on our website or contact our customer support for assistance.

YOU ARE IN GOOD COMPANY!

The Brand of Choice for Contractors and Fabricators Worldwide.

Thermal Arc is a Global Brand of Arc Welding Products for Thermadyne Industries Inc. We manufacture and supply to major welding industry sectors worldwide including; Manufacturing, Construction, Mining, Automotive, Aerospace, Engineering, Rural and DIY/Hobbyist.

We distinguish ourselves from our competition through market-leading, dependable products that have stood the test of time. We pride ourselves on technical innovation, competitive prices, excellent delivery, superior customer service and technical support, together with excellence in sales and marketing expertise.

Above all, we are committed to develop technologically advanced products to achieve a safer working environment within the welding industry.

WARNINGS

Read and understand this entire Manual and your employer's safety practices before installing, operating, or servicing the equipment.

While the information contained in this Manual represents the Manufacturer's best judgement, the Manufacturer assumes no liability for its use.

Service Manual Number 0-5152 for:
Thermal Arc Fabricator 181i Inverter Plant Part Number W1003186
Thermal Arc Fabricator 181i Inverter Power Source (unpacked) Part Number W1003185

Published by:
Thermadyne Industries, Inc.
16052 Swingley Ridge Road, Suite 300
St Louis, Mo63017
USA

www.thermadyne.com

Publication Date: April 27, 2011
Revision AB Date: April 06, 2012

Record the following information for Warranty purposes:

Where Purchased: _____

Purchase Date: _____

Equipment Serial #: _____

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TABLE OF CONTENTS

SECTION 1:
SAFETY INSTRUCTIONS AND WARNINGS

WARNING

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR. DO NOT LOSE THESE INSTRUCTIONS. READ OPERATING/INSTRUCTION MANUAL BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

Welding products and welding processes can cause serious injury or death, or damage to other equipment or property, if the operator does not strictly observe all safety rules and take precautionary actions.

Safe practices have developed from past experience in the use of welding and cutting. These practices must be learned through study and training before using this equipment. Some of these practices apply to equipment connected to power lines; other practices apply to engine driven equipment. Anyone not having extensive training in welding and cutting practices should not attempt to weld.

Safe practices are outlined in the European Standard EN60974-1 entitled: Safety in welding and allied processes Part 2: Electrical. This publication and other guides to what you should learn before operating this equipment are listed at the end of these safety precautions. **HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.**

1.01 Arc Welding Hazards

WARNING

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard

1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Insulate yourself from work and ground using dry insulating mats or covers.
4. Disconnect input power or stop engine before installing or servicing this equipment. Lock input power disconnect switch open, or remove line fuses so power cannot be turned on accidentally.
5. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
6. Turn off all equipment when not in use. Disconnect power to equipment if it will be left unattended or out of service.
7. Use fully insulated electrode holders. Never dip holder in water to cool it or lay it down on the ground or the work surface. Do not touch holders connected to two welding machines at the same time or touch other people with the holder or electrode.
8. Do not use worn, damaged, undersized, or poorly spliced cables.
9. Do not wrap cables around your body.
10. Ground the workpiece to a good electrical (earth) ground.
11. Do not touch electrode while in contact with the work (ground) circuit.
12. Use only well-maintained equipment. Repair or replace damaged parts at once.
13. In confined spaces or damp locations, do not use a welder with AC output unless it is equipped with a voltage reducer. Use equipment with DC output.
14. Wear a safety harness to prevent falling if working above floor level.
15. Keep all panels and covers securely in place.

WARNING

ARC RAYS can burn eyes and skin; NOISE can damage hearing.

Arc rays from the welding process produce intense heat and strong ultraviolet rays that can burn eyes and skin. Noise from some processes can damage hearing.

1. Use a Welding Helmet or Welding Faceshield fitted with a proper shade of filter (see ANSI Z49.1 and EN60974-1 listed in Safety Standards) to protect your face and eyes when welding or watching.
2. Wear approved safety glasses. Side shields recommended.
3. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
4. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.
5. Use approved ear plugs or ear muffs if noise level is high.

6. Never wear contact lenses while welding.

WARNING

FUMES AND GASES can be hazardous to your health.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

1. Keep your head out of the fumes. Do not breath the fumes.

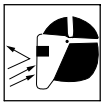
2. If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
3. If ventilation is poor, use an approved air-supplied respirator.
4. Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals, consumables, coatings, and cleaners.
5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.
6. Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapours to form highly toxic and irritating gases.
7. Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

WARNING

WELDING can cause fire or explosion.

Sparks and spatter fly off from the welding arc. The flying sparks and hot metal, weld spatter, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode or welding wire to metal objects can cause sparks, overheating, or fire.

1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within 10.7m (35 ft) of the welding arc. If this is not possible, tightly cover them with approved covers.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
5. Watch for fire, and keep a fire extinguisher nearby.
6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Do not weld on closed containers such as tanks or drums.
8. Connect work cable to the work as close to the welding area as practical to prevent welding current from travelling long, possibly unknown paths and causing electric shock and fire hazards.
9. Do not use welder to thaw frozen pipes.
10. Remove stick electrode from holder or cut off welding wire at contact tip when not in use.



WARNING

FLYING SPARKS AND HOT METAL can cause injury.

Chipping and grinding cause flying metal. As welds cool, they can throw off slag.

1. Wear approved face shield or safety goggles. Side shields recommended.
2. Wear proper body protection to protect skin.

WARNING

CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

1. Protect compressed gas cylinders from excessive heat, mechanical shocks, and arcs.
2. Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
3. Keep cylinders away from any welding or other electrical circuits.
4. Never allow a welding electrode to touch any cylinder.
5. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
6. Turn face away from valve outlet when opening cylinder valve.
7. Keep protective cap in place over valve except when cylinder is in use or connected for use.
8. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

Recommended Protective Filters for Electric Welding		
Description of Process	**Approximate Range of Welding Current in Amps**	**Minimum Shade Number of Filter(s)**
Manual Metal Arc Welding - covered electrodes (MMA)	Less than or equal to 100	8
	100 to 200	10
	200 to 300	11
	300 to 400	12
	Greater than 400	13
Gas Metal Arc Welding (GWAW) (MIG) other than Aluminium and Stainless Steel	Less than or equal to 150	10
	150 to 250	11
	250 to 300	12
	300 to 400	13
	Greater than 400	14
Gas Metal Arc Welding (GMAW) (MIG) Aluminium and Stainless Steel	Less than or equal to 250	12
	250 to 350	13
Gas Tungsten Arc Welding (GTAW) (TIG)	Less than or equal to 100	10
	100 to 200	11
	200 to 250	12
	250 to 350	13
	Greater than 350	14
Flux-cored Arc Welding (FCAW) -with or without shielding gas.	Less than or equal to 300	11
	300 to 400	12
	400 to 500	13
	Greater than 500	14
Air - Arc Gouging	Less than or equal to 400	12
Plasma - Arc Cutting	50 to 100	10
	100 to 400	12
	400 to 800	14
Plasma - Arc Spraying	—	15
Plasma - Arc Welding	Less than or equal to 20	8
	20 to 100	10
	100 to 400	12
	400 to 800	14
Submerged - Arc Welding	—	2(5)
Resistance Welding	—	Safety Spectacles or eye shield

Refer to standard AS/NZS 1338.1:1992 for comprehensive information regarding the above table.

WARNING

MOVING PARTS can cause injury.

Moving parts, such as fans, rotors, and belts can cut fingers and hands and catch loose clothing.

1. Keep all doors, panels, covers, and guards closed and securely in place.
2. Stop engine before installing or connecting unit.
3. Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
4. To prevent accidental starting during servicing, disconnect negative (-) battery cable from battery.
5. Keep hands, hair, loose clothing, and tools away from moving parts.
6. Reinstall panels or guards and close doors when servicing is finished and before starting engine.

WARNING

This product, when used for welding or cutting, produces fumes or gases which contain chemicals know to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety code Sec. 25249.5 et seq.)

NOTE

Considerations About Welding And The Effects of Low Frequency Electric and Magnetic Fields

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, Biological Effects of Power Frequency Electric & Magnetic Fields - Background Paper, OTA-BP-E-63 (Washington, DC: U.S. Government Printing Office, May 1989): "...there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields and interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

To reduce magnetic fields in the workplace, use the following procedures.

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cable around the body.
4. Keep welding power source and cables as far away from body as practical.

ABOUT PACEMAKERS:

The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.

1.02 Principal Safety Standards

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126.

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126.

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices for Occupation and Educational Eye and Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safety in welding and allied processes Part 1: Fire Precautions, EN 60974-1 from SAI Global Limited, www.saiglobal.com.

Safety in welding and allied processes Part 2: Electrical, EN 60974-1 from SAI Global Limited, www.saiglobal.com.

Filters for eye protectors - Filters for protection against radiation generated in welding and allied operations AS/NZS 1338.1:1992 from SAI Global Limited, www.saiglobal.com.

1.03 Declaration of Conformity

Manufacturer: Thermadyne Corporation
Address: 16052 Swingley Ridge Road, Suite 300
St Louis, Mo63017
USA

Description of equipment: Welding Equipment (GMAW, FCAW, GTAW, MMA) including, but not limited to Thermal Arc Fabricator 181i Multi Process Welding Inverter and associated accessories.

Serial numbers are unique with each individual piece of equipment and details description, parts used to manufacture a unit and date of manufacture.

The equipment conforms to all applicable aspects and regulations of the 'Low Voltage Directive' (Directive 73/23/EU), as recently changed in Directive 93/68/EU and to the National legislation for the enforcement of the Directive.

National Standard and Technical Specifications

The product is designed and manufactured to a number of standards and technical requirements among them are:

- IEC 60974-10 applicable to Industrial Equipment - generic emissions and regulations.
- EN 60974-1 Safety in welding and allied processes.
- EN 60974-1 / IEC 60974-1 applicable to welding equipment and associated accessories.
- Extensive product design verification is conducted at the manufacturing facility as part of the routine design and manufacturing process, to ensure the product is safe and performs as specified. Rigorous testing is incorporated into the manufacturing process to ensure the manufactured product meets or exceeds all design specifications.
- 2002/95/EC RoHS directive

WARNING

This equipment does not comply with IEC 61000-3-12. If it is connected to a public low voltage system, it is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment may be connected.

Thermadyne has been manufacturing and merchandising an extensive equipment range with superior performance, ultra safe operation and world class quality for more than 30 years and will continue to achieve excellence.

Manufacturers responsible representative in Europe: Steve Ward
Operations Director
Thermadyne Europe
Europa Building
Chorley N Industrial Park
Chorley, Lancashire,
England PR6 7BX

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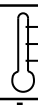
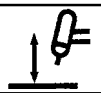
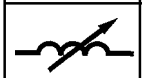
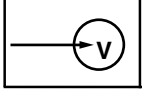
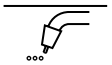
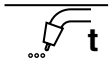
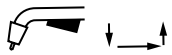
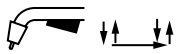
1.04 Symbol Chart

Note that only some of these symbols will appear on your model.

	On
	Off
	Dangerous Voltage
	Increase/Decrease
	Circuit Breaker
	AC Auxiliary Power
	Fuse
A	Amperage
V	Voltage
Hz	Hertz (cycles/sec)
f	Frequency
—	Negative
+	Positive
⎓	Direct Current (DC)
	Protective Earth (Ground)
	Line
	Line Connection
	Auxiliary Power
115V 15A ~	Receptacle Rating- Auxiliary Power

1 ~	Single Phase
3 ~	Three Phase
	Three Phase Static Frequency Converter-Transformer-Rectifier
	Remote
X	Duty Cycle
%	Percentage
	Panel/Local
	Shielded Metal Arc Welding (SMAW)
	Gas Metal Arc Welding (GMAW)
	Gas Tungsten Arc Welding (GTAW)
	Air Carbon Arc Cutting (CAC-A)
	Constant Current
	Constant Voltage Or Constant Potential
	High Temperature
	Fault Indication
	Arc Force
	Touch Start (GTAW)
	Variable Inductance
	Voltage Input

	Wire Feed Function
	Wire Feed Towards Workpiece With Output Voltage Off.
	Welding Gun
	Purging Of Gas
	Continuous Weld Mode
	Spot Weld Mode
	Spot Time
	Preflow Time
	Postflow Time
	2 Step Trigger Operation Press to initiate wirefeed and welding, release to stop.
	4 Step Trigger Operation Press and hold for preflow, release to start arc. Press to stop arc, and hold for preflow.
	Burnback Time
	Disturbance In Ground System
IPM	Inches Per Minute
MPM	Meters Per Minute

Art # A-04937

1.05 Servicing Hazards

WARNING

The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard.

Only qualified persons should test, maintain, and repair this unit.

Only qualified persons should test, maintain, and repair this unit.

WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source and wire feeder and disconnect and lockout input power using line disconnect switch, circuit breakers, or by removing plug from receptacle, or stop engine before servicing unless the procedure specifically requires an energized unit.
- Insulate yourself from ground by standing or working on dry insulating mats big enough to prevent contact with the ground.
- Do not leave live unit unattended.
- If this procedure requires and energized unit, have only personnel familiar with and following standard safety practices do the job.
- When testing a live unit, use the one-hand method. Do not put both hands inside unit. Keep one hand free.
- Disconnect input power conductors from de-energized supply line BEFORE moving a welding power source.

  SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.
- Turn Off inverters, disconnect input power, and discharge input capacitors according to instructions in Troubleshooting Section before touching any parts.

WARNING

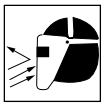
STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.

WARNING

FIRE OR EXPLOSION hazard.

- Do not place unit on, over, or near combustible surfaces.
- Do not service unit near flammables.



WARNING

FLYING METAL or DIRT can injure eyes.

- Wear safety glasses with side shields or face shield during servicing.
- Be careful not to short metal tools, parts, or wires together during testing and servicing.

WARNING

HOT PARTS can cause sever burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle not parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.

WARNING

EXPLODING PARTS can cause injury.

- Failed parts can explode or cause other parts to explode when power is applied to inverters.
- Always wear a face shield and long sleeves when servicing inverters.

WARNING

SHOCK HAZARD from testing.

- Turn Off welding power source and wire feeder or stop engine before making or changing meter lead connections.
- Use at least one meter lead that has a self-retaining spring clip such as an alligator clip.
- Read instructions for test equipment.

WARNING

FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.

WARNING

MOVING PARTS can cause injury,

- Keep away from moving parts such as fans.
- Keep away from pinch points such as drive rolls.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance as necessary.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.

WARNING

MAGNETIC FIELDS can affect Implanted Medical Devices.

- Wearers of Pacemakers and other Implanted Medical Devices should keep away from servicing areas until consulting their doctor and the device manufacturer.

WARNING

OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.

WARNING

H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment install, test, and service H.F. producing units.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.

WARNING

READ INSTRUCTIONS.

- Use Testing Booklet (Part No. 150 853) when servicing this unit.
- Consult the Owner's Manual for welding safety precautions.
- Use only genuine replacement parts from the manufacturer.

1.06 EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: "The body of evidence, in the committee's judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard." However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2: INTRODUCTION

2.01 How to Use This Manual

This Manual usually applies to the part numbers listed on page i. To ensure safe operation, read the entire manual, including the chapter on safety instructions and warnings. Throughout this manual, the word WARNING, CAUTION and NOTE may appear. Pay particular attention to the information provided under these headings. These special annotations are easily recognized as follows:

WARNING

Gives information regarding possible personal injury. Warnings will be enclosed in a box such as this.

CAUTION

Refers to possible equipment damage. Cautions will be shown in bold type.

NOTE

Offers helpful information concerning certain operating procedures. Notes will be shown in italics

You will also notice icons from the safety section appearing throughout the manual. These are to advise you of specific types of hazards or cautions related to the portion of information that follows. Some may have multiple hazards that apply and would look something like this:

2.02 Equipment Identification

The unit's identification number (specification or part number), model, and serial number usually appear on a nameplate attached to the machine. Equipment which does not have a nameplate attached to the machine is identified only by the specification or part number printed on the shipping container. Record these numbers for future reference.

2.03 Receipt of Equipment

When you receive the equipment, check it against the invoice to make sure it is complete and inspect the equipment for possible damage due to shipping. If there is any damage, notify the carrier immediately to file a claim. Furnish complete information concerning damage claims or shipping errors to the location in your area listed in the inside back cover of this manual. Include all equipment identification numbers as described above along with a full description of the parts in error.

2.04 Description

The Thermal Arc Fabricator 181i is a self contained single phase multi process welding inverter that is capable of performing GMAW/FCAW (MIG), MMA (Stick) and GTAW (Lift TIG) welding processes. The unit is equipped with an integrated wire feed unit, digital voltage and amperage meters, and a host of other features in order to fully satisfy the broad operating needs of the modern welding professional. The unit is also fully compliant to European Standard EN 60974-1.

The Fabricator 181i MIG provides excellent welding performance across a broad range of applications when used with the correct welding consumables and procedures. The following instructions detail how to correctly and safely set up the machine and give guidelines on gaining the best efficiency and quality from the Power Source. Please read these instructions thoroughly before using the unit.

2.05 Transportation Methods

Disconnect input power conductors from de-energized supply line before moving the welding power source.

Lift unit with handle on top of case. Use handcart or similar device of adequate capacity. If using a fork lift vehicle, secure the unit on a proper skid before transporting.

2.06 Packaged Items

Fabricator 181i Plant (Part No. W1003186)

- Fabricator 181i Inverter Power Source
- Tweco WeldSkill 180A MIG Torch
- Feed rolls: 0.6/0.8mm V Groove (fitted)
- Electrode Holder with 4m Lead
- Work Clamp with 4m Lead
- Shielding Gas Hose Assembly
- Shoulder Strap
- Operating Manual

SECTION 3:
SAFETY AND INSTALLATION

3.01 Duty Cycle

The rated duty cycle of a Welding Power Source, is a statement of the time that it may be operated at its rated welding current output without exceeding the temperature limits of the insulation of the component parts. To explain the 10 minute duty cycle period the following example is used. Suppose a Welding Power Source is designed to operate at a 20% duty cycle, 180 amperes at 23 volts. This means that it has been designed and built to provide the rated amperage (180 A) for 2 minutes, i.e. arc welding time, out of every 10 minute period (20% of 10 minutes is 2 minutes). During the other 8 minutes of the 10 minute period the Welding Power Source must idle and be allowed to cool.

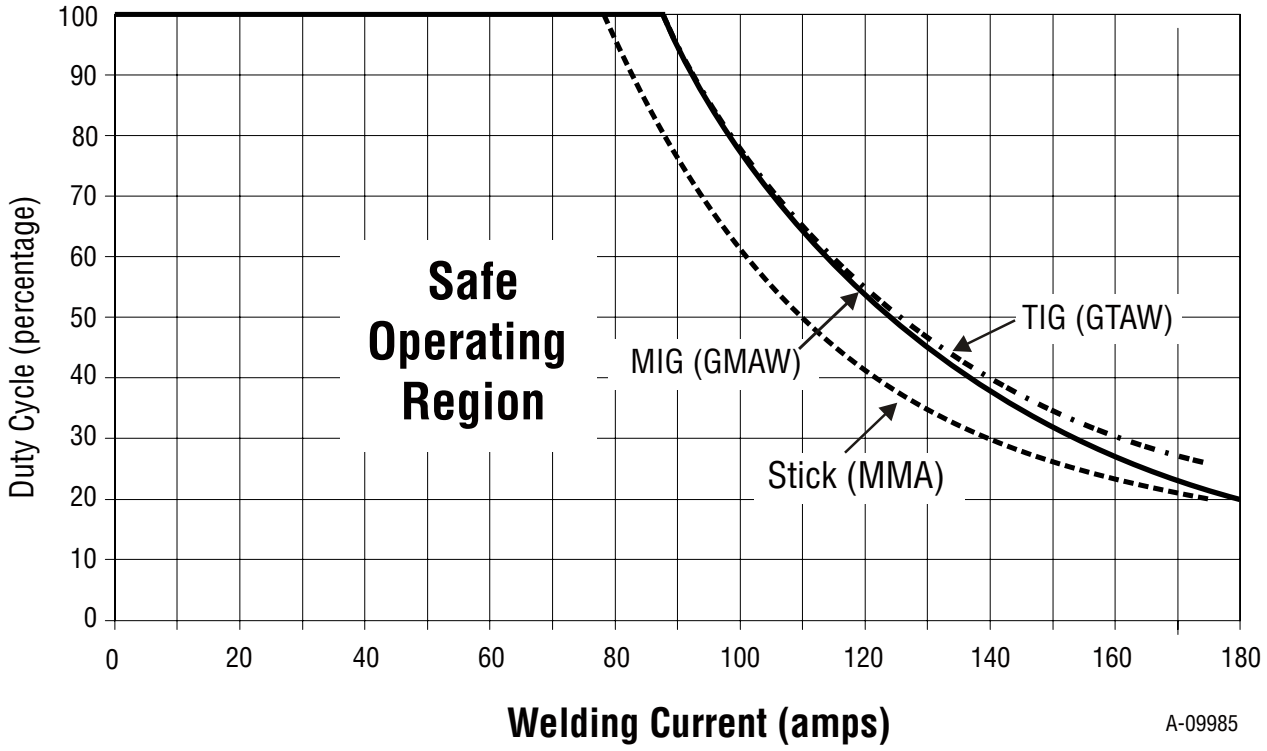


Figure 3-1: Fabricator 181i Duty Cycle

3.02 Specifications

DESCRIPTION	FABRICATOR 181i MULTI PROCESS WELDING INVERTER
Power Source (unpacked) Part No.	W1003185
Power Source Dimensions	H410mm x W210mm x D450mm
Power Source Mass	14.6kg
Cooling	Fan Cooled
Welder Type	Multi Process Inverter Power Source
European Standard	EN 60974.1
Number of Phases	Single Phase
Nominal Supply Voltage	230V ± 15%
Nominal Supply Frequency	50/60Hz
Welding Current Range (MIG Mode)	10-180A
Effective Input Current (I_{1eff})	16.6 Amps
Maximum Input Current (I_{1max})	37 Amps
Single Phase Generator Requirement	9 KVA
MIG (GMAW) Welding Output, 40℃, 10 min.	180A @ 20%, 23V 113A @ 60%, 19.7V 88A @ 100%, 18.4V
STICK (MMA) Welding Output, 40℃, 10 min.	175A @ 20%, 27V 101A @ 60%, 24V 78A @ 100%, 23.1V
TIG (GTAW) Welding Output, 40℃, 10 min.	175A @ 25%, 17V 113A @ 60%, 14.5V 88A @ 100%, 13.5V
Protection Class	IP23S

Table 3-1: Fabricator 181i Specification

NOTE

Due to variations that can occur in manufactured products, claimed performance, voltages, ratings, all capacities, measurements, dimensions and weights quoted are approximate only. Achievable capacities and ratings in use and operation will depend upon correct installation, use, applications, maintenance and service.

3.03 Environment

These units are designed for use in environments with increased hazard of electric shock.

A. Examples of environments with increased hazard of electric shock are:

1. In locations in which freedom of movement is restricted, so that the operator is forced to perform the work in a cramped (kneeling, sitting or lying) position with physical contact with conductive parts.
2. In locations which are fully or partially limited by conductive elements, and in which there is a high risk of unavoidable or accidental contact by the operator.
3. In wet or damp hot locations where humidity or perspiration considerable reduces the skin resistance of the human body and the insulation properties of accessories.

B. Environments with increased hazard of electric shock do not include places where electrically conductive parts in the near vicinity of the operator, which can cause increased hazard, have been insulated.

3.04 Location

Be sure to locate the welder according to the following guidelines:

- In areas, free from moisture and dust.
- Ambient temperature between 14°F (-10°C) to 104° F (40° C).
- In areas, free from oil, steam and corrosive gases.
- In areas, not subjected to abnormal vibration or shock.
- In areas, not exposed to direct sunlight or rain.
- Place at a distance of 300mm (12”) or more from walls or similar that could restrict natural air flow for cooling
- The enclosure design of this power source meets the requirements of IP23S as outlined in EN 60529. This provides adequate protection against solid objects (greater than 12mm), and direct protection from vertical drops. Under no circumstances should the unit be operated or connected in a micro environment that will exceed the stated conditions. For further information please refer to EN 60529.
- Precautions must be taken against the power source toppling over. The power source must be located on a suitable horizontal surface in the upright position when in use.

WARNING

Thermal Arc advises that this equipment be electrically connected by a qualified electrician.

3.05 Ventilation

Since the inhalation of welding fumes can be harmful, ensure that the welding area is effectively ventilated.

3.06 Mains Supply Voltage Requirements

The Mains supply voltage should be within ± 15% of the rated mains supply voltage. Too low a voltage may cause poor welding performance. Too high a supply voltage will cause components to overheat and possibly fail.

The Welding Power Source must be:

- Correctly installed, if necessary, by a qualified electrician.
- Correctly earthed (electrically) in accordance with local regulations.
- Connected to the correct size power point and fuse as per the Specifications on page 3-2.

WARNING

Any electrical work must be carried out by a qualified Electrical Tradesperson.

3.07 Electrical Input Connections

WARNING

ELECTRIC SHOCK can kill; SIGNIFICANT DC VOLTAGE is present after removal of input power.

DO NOT TOUCH live electrical parts.

SHUT DOWN welding power source, disconnect input power employing lockout/tagging procedures. Lock-out/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

• Electrical Input Requirements

Operate the welding power source from a single-phase 50/60 Hz, AC power supply. The input voltage must match one of the electrical input voltages shown on the input data label on the unit nameplate. Contact the local electric utility for information about the type of electrical service available, how proper connections should be made, and inspection required. The line disconnect switch provides a safe and convenient means to completely remove all electrical power from the welding power supply whenever necessary to inspect or service the unit.

Do not connect an input (WHITE or BLACK) conductor to the ground terminal.

Do not connect the ground (GREEN) conductor to an input line terminal.

1. Connection end of ground (GREEN or GREEN/YELLOW) conductor to a suitable ground. Use a grounding method that complies with all applicable electrical codes.
2. Connect ends of active (BROWN) and Neutral (BLUE) input conductors to a suitable power supply system that complies with all appliance local electrical codes.

Input Power

Each unit incorporates an INRUSH circuit. When the MAIN CIRCUIT SWITCH is turned on, the inrush circuit provides pre-charging for the input capacitors. A relay in the Main Power PCB1 will turn on after the input capacitors have charged to operating voltage (after approximately 5 seconds).

3.08 Electromagnetic Compatibility

WARNING

Extra precautions for Electromagnetic Compatibility may be required when this Welding Power Source is used in a domestic situation.

A. Installation and Use - Users Responsibility

The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing the welding circuit, see NOTE below. In other cases it could involve constructing an electromagnetic screen enclosing the Welding Power Source and the work, complete with associated input filters. In all cases, electromagnetic disturbances shall be reduced to the point where they are no longer Trouble-some.

NOTE

The welding circuit may or may not be earthed for safety reasons. Changing the earthing arrangements should only be authorised by a person who is competent to assess whether the changes will increase the risk of injury, e.g. by allowing parallel welding current return paths which may damage the earth circuits of other equipment. Further guidance is given in IEC 974-13 Arc Welding Equipment - Installation and use (under preparation).

B. Assessment of Area

Before installing welding equipment, the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account.

1. Other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment.
2. Radio and television transmitters and receivers.
3. Computer and other control equipment.
4. Safety critical equipment, e.g. guarding of industrial equipment.
5. The health of people around, e.g. the use of pace-makers and hearing aids.

6. Equipment used for calibration and measurement.
7. The time of day that welding or other activities are to be carried out.
8. The immunity of other equipment in the environment: the user shall ensure that other equipment being used in the environment is compatible: this may require additional protection measures.

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

C. Methods of Reducing Electromagnetic Emissions

1. Mains Supply

   Welding equipment should be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. Consideration should be given to shielding the supply cable of permanently installed welding equipment in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the Welding Power Source so that good electrical contact is maintained between the conduit and the Welding Power Source enclosure.

2. Maintenance of Welding Equipment

   The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendation

3. Welding Cables

   The welding cables should be kept as short as possible and should be positioned close together, running at or close to the floor level.

4. Equipotential Bonding

   Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching the metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

5. Earthing of the Work Piece

   Where the work piece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, e.g. ship's hull or building steelwork, a connection bonding the work piece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the work piece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the work piece to earth should be made by direct connection to the work piece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

6. Screening and Shielding

   Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening the entire welding installation may be considered for special applications.

3.09 Volt-Ampere Curves

Voltage-Amperage Curves shows maximum voltage and amperage output capabilities of welding power source. Curves of other settings fall between curves shown.

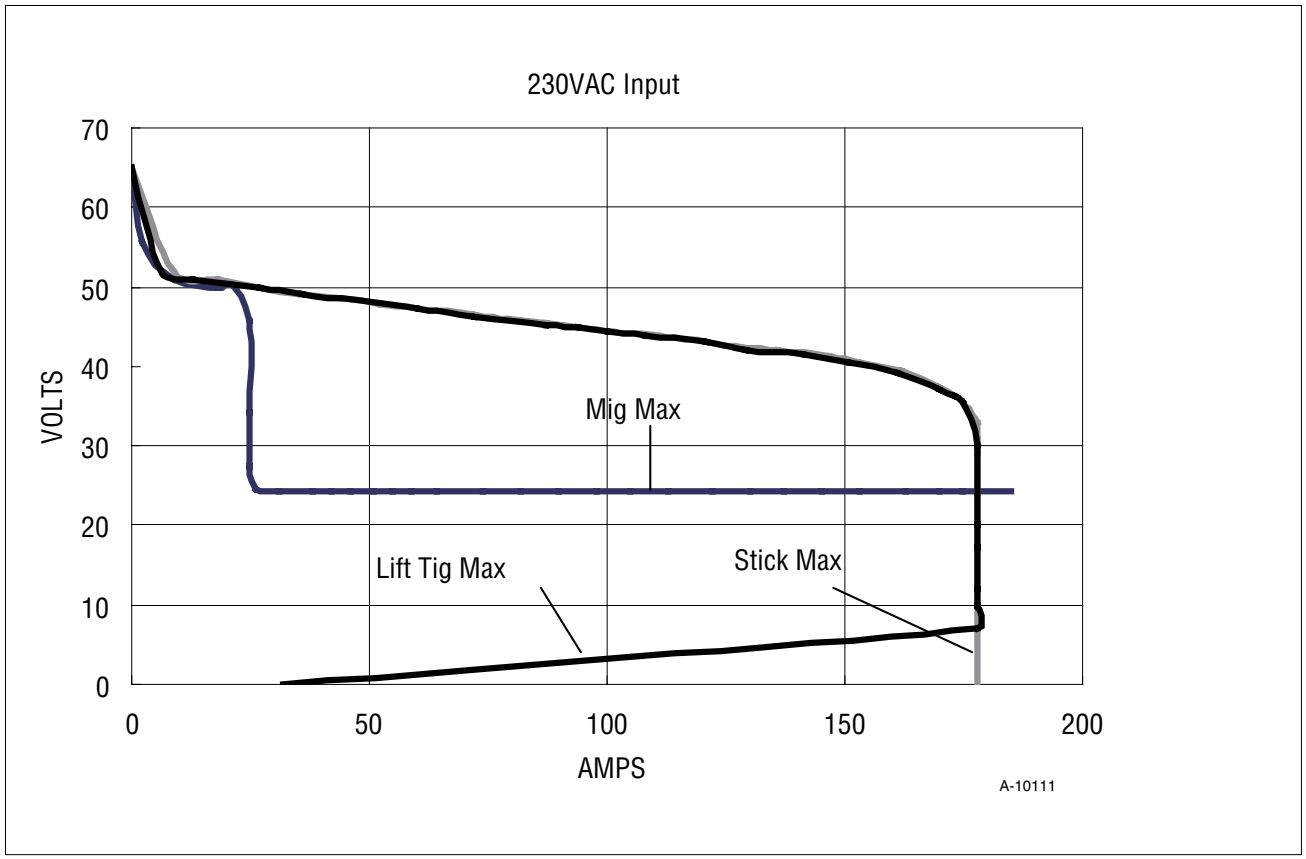


Figure 3-2: Fabricator 181i Volt-Ampere Curves

SECTION 4: OPERATION

4.01 Fabricator 181i Power Source Controls, Indicators and Features

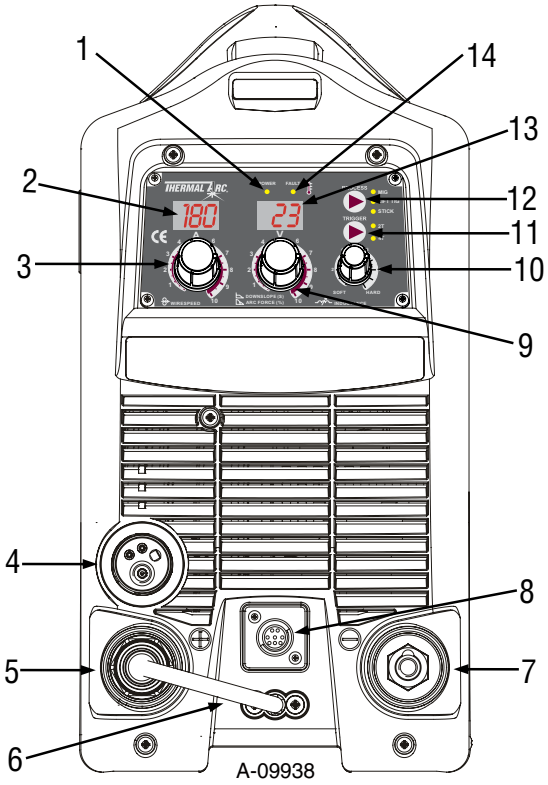


Figure 4-1: Front Panel

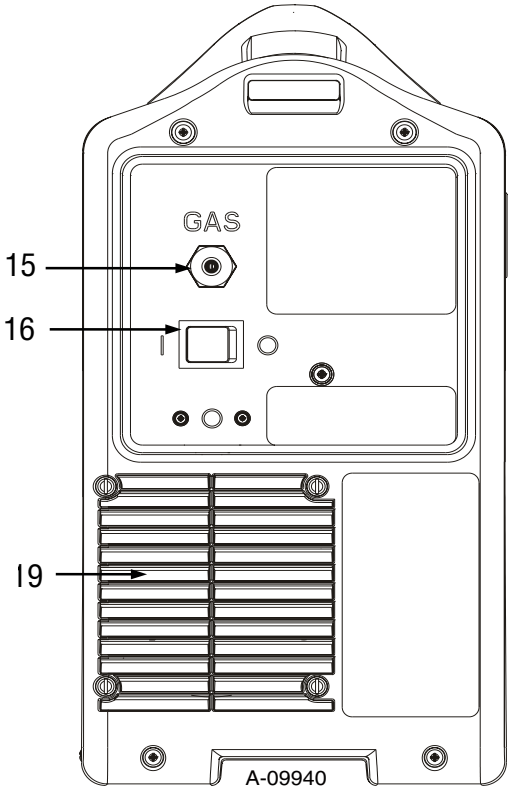


Figure 4-2: Rear Panel

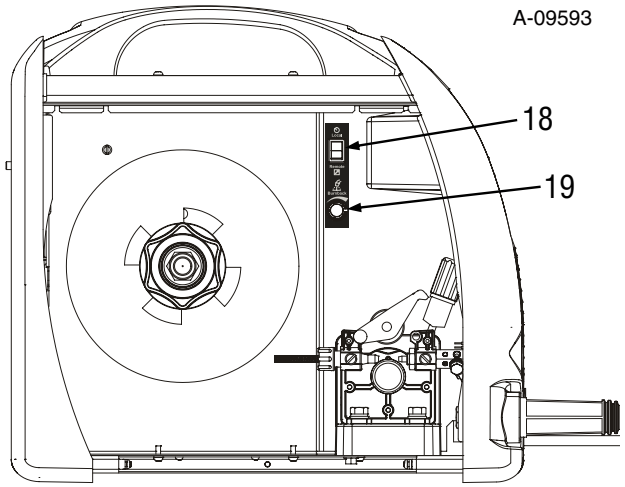


Figure 4-3: Wire Feed Compartment Control

1. Power Indicator

The power indicator is illuminated when the correct mains power is applied to the power source and when the ON/OFF switch located on the rear panel is in the ON position.

2. Digital Amps Meter

The digital amperage meter is used to display both the pre-set current (Stick and TIG modes only) and actual output current (all modes) of the power source.

At times of non-welding, the amperage meter will display a pre-set (preview) value in both MMA (Stick) and GTAW (TIG) modes. This value can be adjusted by varying the amperage potentiometer (item 4). Note that in GMAW/FCAW (MIG) mode, the amperage meter will not preview welding current and will display zero.

When welding, the amperage meter will display actual welding current in all modes.

At the completion of welding, the amperage meter will hold the last recorded amperage value for a period of approximately 10 seconds in all modes. The amperage meter will hold the value until; (1) any of the front panel controls are adjusted in which case the unit will revert to preview mode, (2) welding is recommenced, in which case actual welding amperage will be displayed, or (3) a period of 10 seconds elapses following the completion of welding in which case the unit will return to preview mode.

3. Amperage Control (Wirespeed)

The amperage control knob adjusts the amount of welding current delivered by the power source. In MMA (stick) and GTAW (TIG) modes, the amperage control knob directly adjusts the power inverter to deliver the desired level of output current. In GMAW/FCAW modes (MIG), the amperage knob adjusts the speed of the wire feed motor (which in turn adjusts the output current by varying the amount of MIG wire delivered to the welding arc). The optimum wire speed required will dependent on the type of welding application. The setup chart on the inside of the wire feed compartment door provides a brief summary of the required output settings for a basic range of MIG welding applications.

4. MIG Torch Adaptor (Euro Style)

The MIG torch adaptor is the connection point for the MIG welding torch. Connect the torch by pushing the torch connector into the brass torch adaptor firmly and screwing the plastic torch nut clockwise to secure in position. To remove the MIG Torch simply reverse these directions.

5. Positive Welding Output Terminal

The positive welding terminal is used to connect the welding output of the power source to the appropriate welding accessory such as the MIG torch (via the MIG torch polarity lead), electrode holder lead or work lead. Positive welding current flows from the power source via this heavy duty bayonet type terminal. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.

CAUTION

Loose welding terminal connections can cause overheating and result in the male plug being fused in the bayonet terminal.

6. MIG Torch Polarity Lead

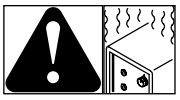
The polarity lead is used to connect the MIG torch to the appropriate positive or negative output terminal (allowing polarity reversal for different welding applications). In general, the polarity lead should be connected in to the positive welding terminal (+) when using steel, stainless steel or aluminium electrode wire. When using gasless wire, the polarity lead is generally connected to the negative welding terminal (-). If in doubt, consult the manufacturer of the electrode wire for the correct polarity. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.

CAUTION

Loose welding terminal connections can cause overheating and result in the male plug being fused in the bayonet terminal.

7. Negative Welding Output Terminal

The negative welding terminal is used to connect the welding output of the power source to the appropriate welding accessory such as the MIG torch (via the MIG torch polarity lead), TIG torch or work lead. Negative welding current flows to the power source via this heavy duty bayonet type terminal. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.



CAUTION

Loose welding terminal connections can cause overheating and result in the male plug being fused in the bayonet terminal.

8. Remote Control Socket

The 8 pin Remote Control Socket is used to connect remote control devices to the welding power source. To make connections, align keyway, insert plug, and rotate threaded collar fully clockwise.

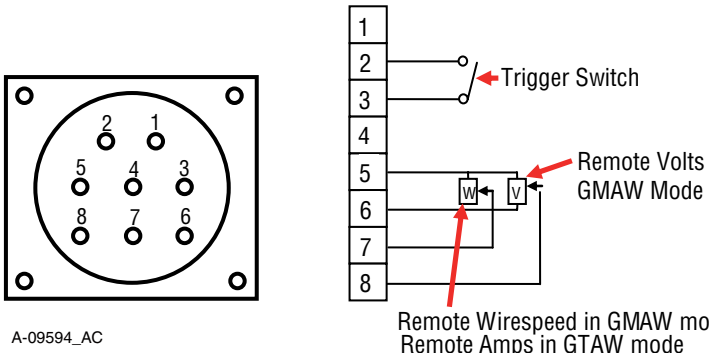


Figure 4-4: Remote Control Socket

Socket Pin	Function
1	Not connected
2	Trigger Switch Input
3	Trigger Switch Input
4	Not connected
5	5k ohm (maximum) connection to 5k ohm remote control potentiometer.
6	Zero ohm (minimum) connection to 5k ohm remote control potentiometer.
7	Wiper arm connection to 5k ohm remote control Wirespeed GMAW (MIG) mode potentiometer. Wiper arm connection to 5k ohm remote control Amps GTAW (TIG) mode potentiometer.
8	Wiper arm connection to 5k ohm remote control Volts GMAW (MIG) mode potentiometer.

Table 4-1

Note that the remote local switch (item 18) located in the wirefeed compartment should be set to remote for the amperage/voltage controls to be operative.

9. Multifunction Control - Voltage, Down Slope & Arc Force

The multifunction control knob is used to adjust three main parameters depending on the welding mode selected.

When GMAW/FCAW (MIG) Mode is Selected

In this mode the control knob is used to adjust the output voltage of the unit. The welding voltage is increased by turning the knob clockwise or decreased by turning the knob anti-clockwise. The optimum voltage level required will dependent on the type of welding application. The setup chart on the inside of the wire feed compartment door provides a brief summary of the required output settings for a basic range of MIG welding applications.

When MMA (Stick) Mode is Selected

In this mode the multifunction control knob is used to adjust arc force. Arc force control provides an adjustable amount of welding force (or "dig") control. This feature can be particularly beneficial in providing the operator the ability to compensate for variability in joint fit-up in certain situations with particular electrodes. In general increasing the arc force control toward '10' (maximum arc force) allows greater penetration control to be achieved. Arc force is increased by turning the control knob clockwise or decreased by turning the knob anti-clockwise

When TIG Mode is Selected

In this mode the multifunction control knob is used to adjust down slope. Down slope allows the user to select the ramp down time at the completion of the weld. The main function of down slope is to allow the welding current to be gradually reduced over a pre-set time frame such that the welding pool is given time to cool sufficiently.

Note that when in 2T normal mode (refer item 12), the unit will enter down slope mode as soon as the trigger switch is released (ie if the multifunction control knob is set to 5, the unit will ramp down from the present welding current to zero over 5 seconds). If no down slope time is selected then the welding output will cease immediately. If the unit is set to 4T latch mode, to enter down slope mode the trigger must be held in for the selected time period (ie press and release trigger to commence welding, then press and hold trigger again to enter down slope mode). Should the trigger be released during the down slope phase (4T only), the output will cease immediately.

10. Arc Control (Inductance)

The arc control operates in GMAW (MIG) mode only and is used to adjust the intensity of the welding arc. Lower arc control settings make the arc softer with less weld spatter. Higher arc control settings give a stronger driving arc which can increase weld penetration.

11. Trigger Mode Control (MIG and TIG Mode only)

The trigger mode control is used to switch the functionality of the of the torch trigger between 2T (normal) and 4T (latch mode)

2T Normal Mode

In this mode, the torch trigger must remain depressed for the welding output to be active. Press and hold the torch trigger to activate the power source (weld). Release the torch trigger switch to cease welding.

4T Latch Mode

This mode of welding is mainly used for long welding runs to reduce operator fatigue. In this mode the operator can press and release the torch trigger and the output will remain active. To deactivate the power source, the trigger switch must again be depressed and realised, thus eliminating the need for the operator to hold the torch trigger.

Note that when operating in GTAW (TIG mode), the power source will remain activated until the selected downslope time has elapsed (refer Item 10).

12. Process Selection Control

The process selection control is used to select the desired welding mode. Three modes are available, GMAW/FCAW (MIG), GTAW (Lift TIG) and (MMA (Stick) modes. Refer to section 4.09 or 4.10 for FCAW/ GMAW (MIG) set up details, section 4.11 for GTAW (TIG) set-up details or section 4.12 for MMA (stick) set-up details.

Note that when the unit is powered off the mode selection control will automatically default to MIG mode. This is necessary so as to prevent inadvertent arcing should an electrode holder be connected to the unit and mistakenly be in contact with the work piece during power up.

13. Digital Voltage Meter

The digital voltage meter is used to display the both the pre-set voltage (MIG mode only) and actual output voltage (all modes) of the power source.

At times of non-welding, the voltage meter will display a pre-set (preview) value in GMAW/FCAW (MIG) modes. This value can be adjusted by varying the multifunction control knob (item 10). Note that in MMA (stick) and GTAW (TIG) modes, the voltage meter will not preview welding voltage and will display zero.

When welding, the voltage meter will display actual welding current in all modes.

At the completion of welding, the digital voltage meter will hold the last recorded voltage value for a period of approximately 10 seconds in all modes. The voltage meter will hold the value until; (1) any of the front panel controls are adjusted in which case the unit will revert to preview mode, (2) welding is recommenced, in which case actual welding amperage will be displayed, or (3) a period of 10 seconds elapses following the completion of welding in which case the unit will return to preview mode.

14. Thermal Overload Indicator

This welding power source is protected by a self resetting thermostat. The indicator will illuminate if the duty cycle of the power source has been exceeded. Should the thermal overload indicator illuminate the output of the power source will be disabled. Once the power source cools down this light will go OFF and the over temperature condition will automatically reset. Note that the mains power switch should remain in the on position such that the fan continues to operate thus allowing the unit to cool sufficiently. Do not switch the unit off should a thermal overload condition be present.

15. Gas Inlet (MIG mode only)

The Gas Inlet connection is used to supply the appropriate MIG welding gas to the unit. Refer to section 4.09 or 4.10 for FCAW/GMAW (MIG) set up details.

WARNING

Only Inert Shielding Gases specifically designed for welding applications should be used.

16. On / Off Switch

This switch is used to turn the unit on/off.

17. Local / Remote Switch (located in wirefeed compartment)

The remote / local switch is used only when a remote control device (such as a TIG torch with remote current control) is fitted to the unit via the remote control socket (item 9). When the local/remote switch is in the remote position, the unit will detect a remote device and work accordingly. When in the local mode, the unit will not detect the remote device and will operate from the power source controls only. Note that the trigger will operate at all times on the remote control socket irrespective of the position of the local remote switch (ie in both local and remote modes).

Should a remote device be connected and the remote/local switch set to remote, the maximum setting of the power source will be determined by the respective front panel control, irrespective of the remote control device setting. As an example, if the output current on the power source front panel is set to 50% and the remote control device is set to 100%, the maximum achievable output from the unit will be 50%. Should 100% output be required, the respective front panel control must be set to 100%, in which case the remote device will then be able to control between 0-100% output.

18. Burnback Control (located in wirefeed compartment)

The burnback control is used to adjust the amount of MIG wire that protrudes from the MIG torch after the completion of MIG welding (commonly referred to as stick out). To decrease the burnback time (or lengthen the amount of wire protruding from the MIG torch at the completing of welding), turn the burnback control knob anti clockwise. To increase the burnback time (or shorten the amount of wire protruding from the torch at the completing of welding), turn the Burnback Control knob clockwise.

19. Fan on Demand

The Fabricator 181i is fitted with a fan on demand feature. Fan on demand automatically switches the cooling fan off when it is not required. This has two main advantages; (1) to minimize power consumption, and (2) to minimise the amount of contaminants such as dust that are drawn into the power source.

Note that the fan will only operate when required for cooling purposes and will automatically switch off when not required.

4.02 Attaching the Tweco WeldSkill 180 Torch (Euro)

Fit the MIG Torch to the power source by pushing the MIG torch connector into the MIG torch adaptor and screwing the plastic torch nut clockwise to secure the MIG torch to the MIG torch adaptor.

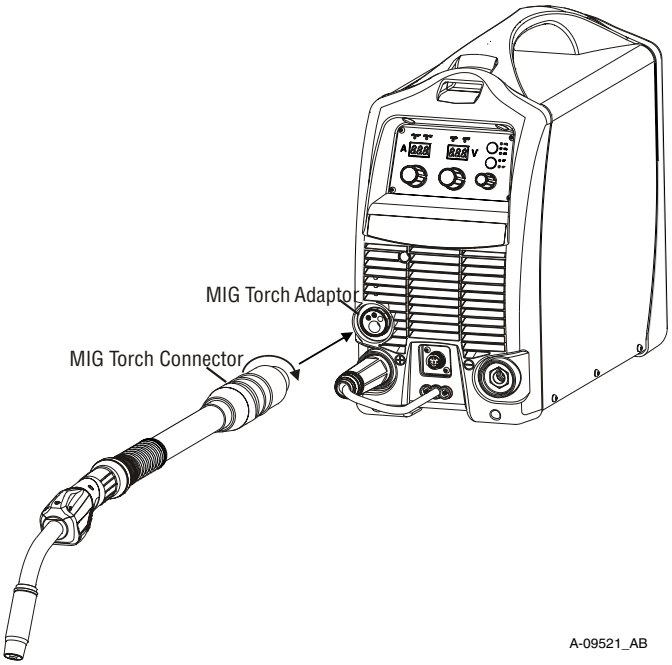


Figure 4-5: Attaching MIG Torch

4.03 Installing 100mm Diameter Spool

As delivered from the factory, the unit is fitted with a Wire Spool Hub which accepts a 200mm diameter spools. In order to fit a 100mm diameter spool assemble parts in the sequence shown below in Figure 4-6.

Adjustment of the nut with nylon insert will control the MIG Wire Spool Brake. Clockwise rotation of this nut with nylon insert tightens the brake. The brake is correctly adjusted when the spool stops within 10 to 20mm (measured at the outer edge of the spool) after MIG Torch trigger is released. Wire should be slack without becoming dislodged from the spool.

CAUTION

Overtension of brake will cause rapid wear of mechanical WIREFEED parts, overheating of electrical componentry and possibly an increased incidence of electrode wire Burnback into contact tip.

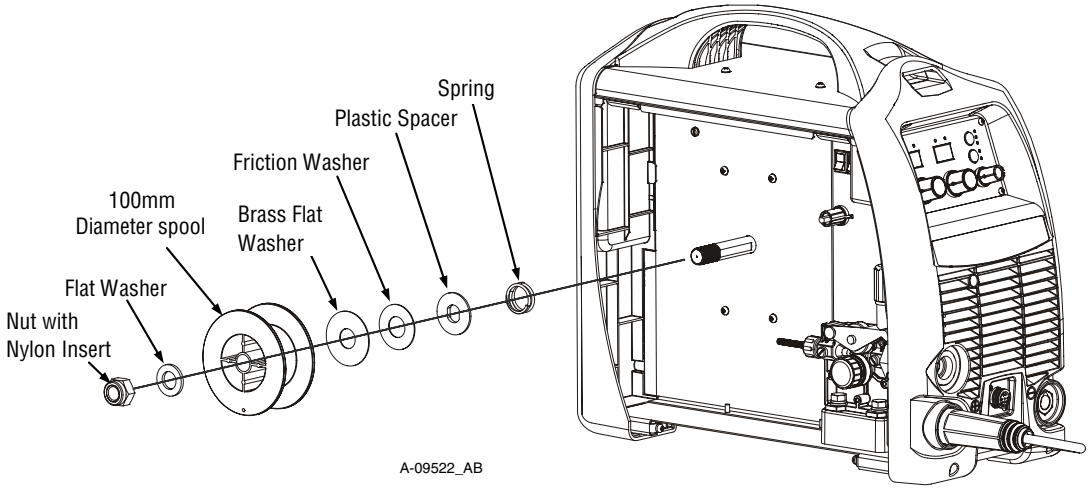


Figure 4-6: 100mm Diameter Spool Installation

4.04 Installing 200mm Diameter Spool

As delivered from the factory, the unit is set for a 200mm diameter spool.

In order to re-fit a 200mm spool assemble parts in the sequence shown below in Figure 4-7.

Adjustment of the nut with nylon insert will control the MIG Wire Spool Brake. Clockwise rotation of this nut with nylon insert tightens the brake. The Brake is correctly adjusted when the spool stops within 10 to 20mm (measured at the outer edge of the spool) after MIG Torch trigger is released. Wire should be slack without becoming dislodged from the spool.

CAUTION

Overtension of brake will cause rapid wear of mechanical WIREFEED parts, overheating of electrical componentry and possibly an increased incidence of electrode wire Burnback into contact tip.

Ensure that the alignment pin on the wire spool hub aligns with the hole allocated in 200mm diameter spool.

NOTE

This alignment pin can be removed by unscrewing in an anticlockwise direction and locating in the appropriate position.

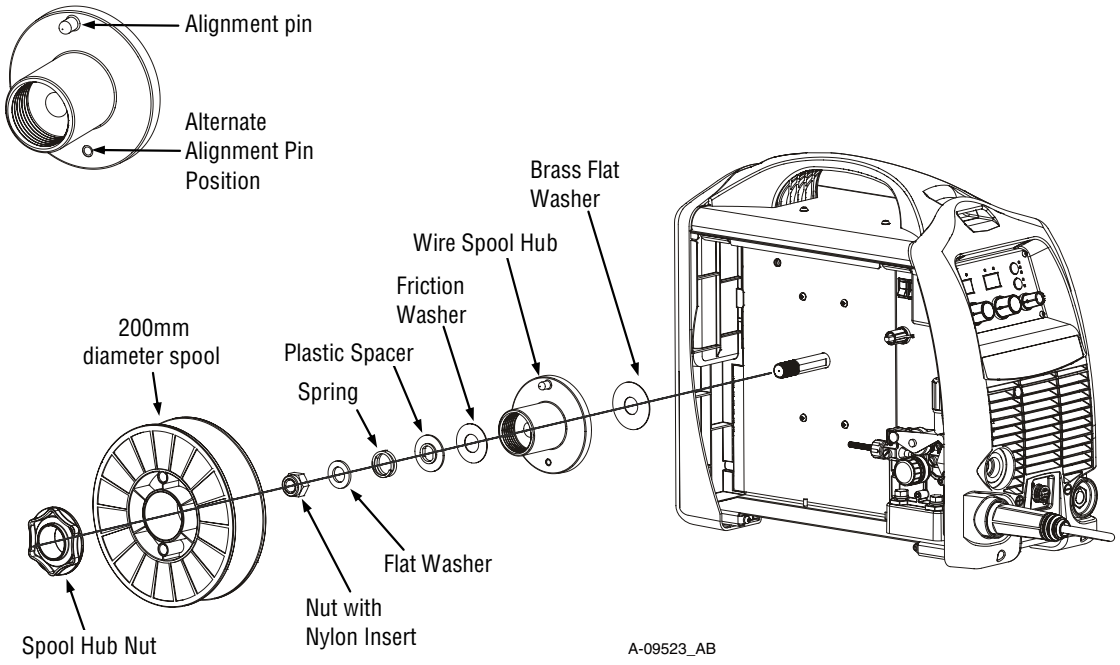
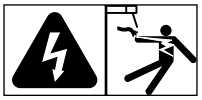


Figure4-7: 200mm Diameter Spool Installation

4.05 Inserting Wire into the Wire Feed Mechanism

Release the tension from the pressure roller by turning the adjustable wire drive tension screw in an anti-clockwise direction. Then to release the pressure roller arm push the tension screw toward the front of the machine which releases the pressure roller arm (Figure 4-8). With the MIG welding wire feeding from the bottom of the spool (Figure 4-9) pass the electrode wire through the inlet guide, between the rollers, through the outlet guide and into the MIG torch. Re-secure the pressure roller arm and wire drive tension screw and adjust the pressure accordingly (Figure 4-8). Remove the contact tip from the MIG torch. With the MIG Torch lead reasonably straight, feed the wire through the torch by depressing the trigger switch. Fit the appropriate contact tip.



WARNING

Before connecting the work clamp to the work make sure the mains power supply is switched off.

The electrode wire will be at welding voltage potential while it is being fed through the system.

Keep MIG Torch away from eyes and face.

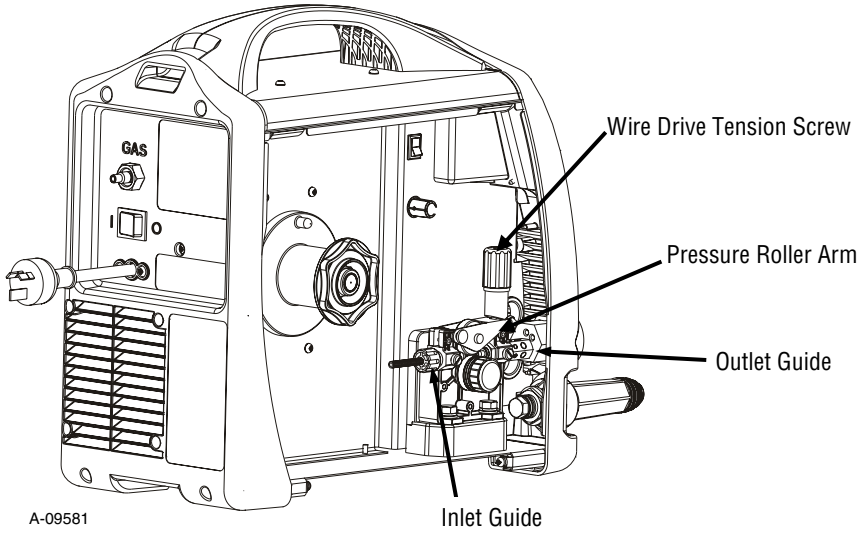


Figure 4-8: Wire Drive Assembly Components

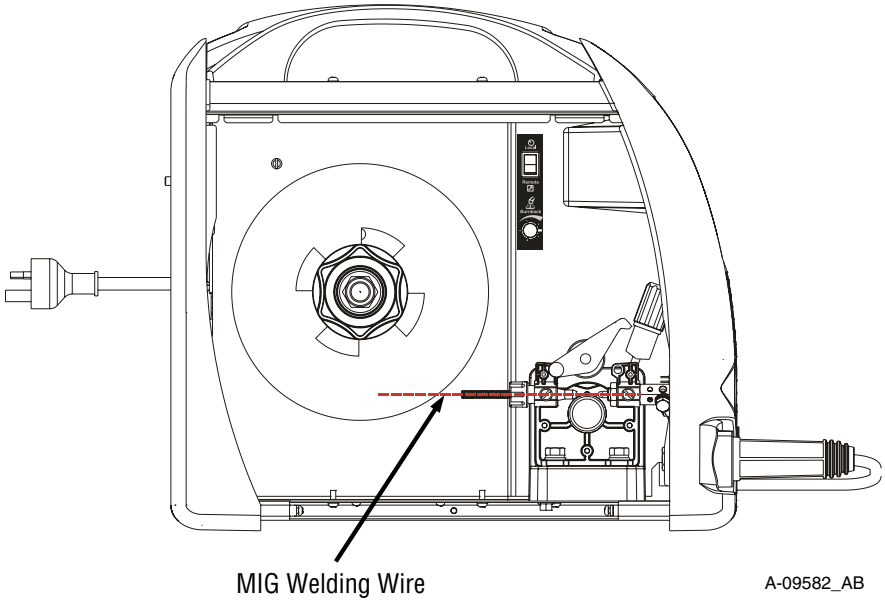


Figure 4-9: MIG Welding Wire - Installation

4.06 Feed Roller Pressure Adjustment

The pressure (top) roller applies pressure to the grooved feed roller via an adjustable pressure screw. These devices should be adjusted to a minimum pressure that will provide satisfactory WIREFEED without slippage. If slipping occurs, and inspection of the wire contact tip reveals no wear, distortion or burn back jam, the conduit liner should be checked for kinks and clogging by metal flakes and swarf. If it is not the cause of slipping, the feed roll pressure can be increased by rotating the pressure screw clockwise.

WARNING

Before changing the feed roller ensure that the mains supply to the power source is switched off.

CAUTION

The use of excessive pressure may cause rapid wear of the feed rollers, shafts and bearing.

4.07 Changing the Feed Roll

To change feed roll remove the feed roll retaining screw by turning in an anticlockwise direction. Once the feed roll is removed then to replace feed roll simply reverse these directions.

A dual groove feed roller is supplied as standard. It can accommodate 0.6/0.8mm diameter hard wires. Select the roller required with the chosen wire size marking facing outward.

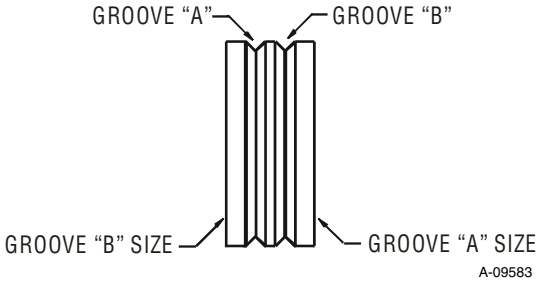


Figure 4-10: Dual Groove Feed Roller

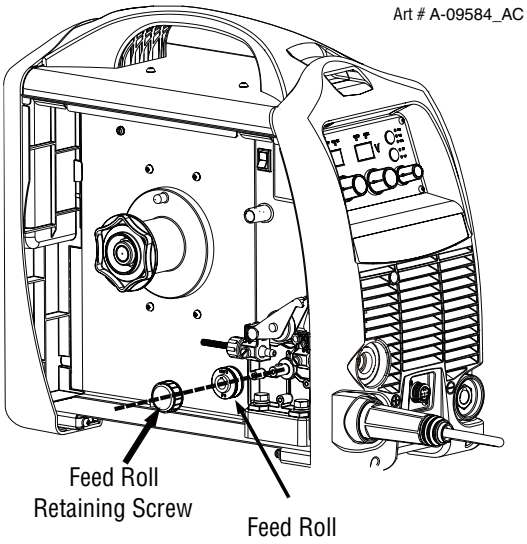


Figure 4-11: Changing the Feed Roll

4.08 Wire Reel Brake

The wire reel hub incorporates a friction brake which is adjusted during manufacture for optimum breaking. If it is considered necessary, adjustment can be made by turning the large nut inside the open end of the hub clockwise to tighten the brake. Correct adjustment will result in the wire reel circumference continuing no further than 10-20mm after release of the trigger. The electrode wire should be slack without becoming dislodged from wire spool.

CAUTION

Overtension of brake will cause rapid wear of mechanical WIREFEED parts, overheating of electrical componentry and possibly an increased incidence of electrode wire Burnback into contact tip.

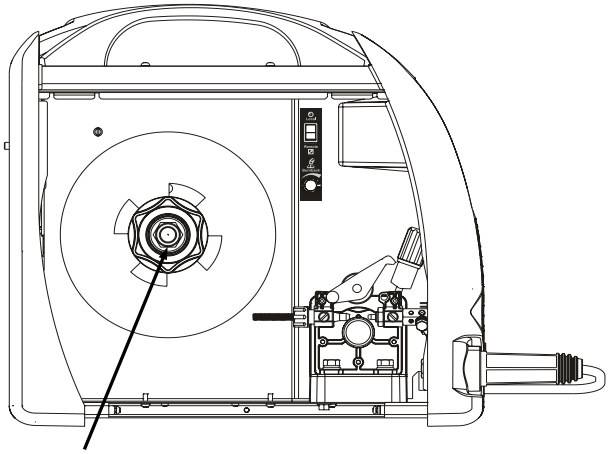


Figure 4-12: Wire Reel Brake

4.09 Setup for MIG (GMAW) Welding with Gas Shielded MIG Wire

A. Select MIG mode with the process selection control. (refer to Section 4.01.12 for further information)

B. Connect the MIG torch polarity lead to the positive welding terminal (+). If in doubt, consult the electrode wire manufacturer. Welding current flows from the Power Source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.

C. Fit the MIG Torch to the power source. (Refer to section 4.02 Attaching the Tweco WeldSkill 180 MIG Torch).

D. Connect the work lead to the negative welding terminal (-). If in doubt, consult the electrode wire manufacturer. Welding current flows from the Power Source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.

E. Fit the welding grade shielding gas regulator/flowmeter to the shielding gas cylinder then connect the shielding gas hose from the rear of the power source to the regulator/flowmeter outlet.

F. Refer to the Weld Guide located on the inside of the wirefeed compartment door for further information.

WARNING

Before connecting the work clamp to the work make sure the mains power supply is switched off.

Secure the welding grade shielding gas cylinder in an upright position by chaining it to a suitable stationary support to prevent falling or tipping.

CAUTION

Loose welding terminal connections can cause overheating and result in the male plug being fused in the terminal.

Remove any packaging material prior to use. Do not block the air vents at the front or rear of the Welding Power Source.

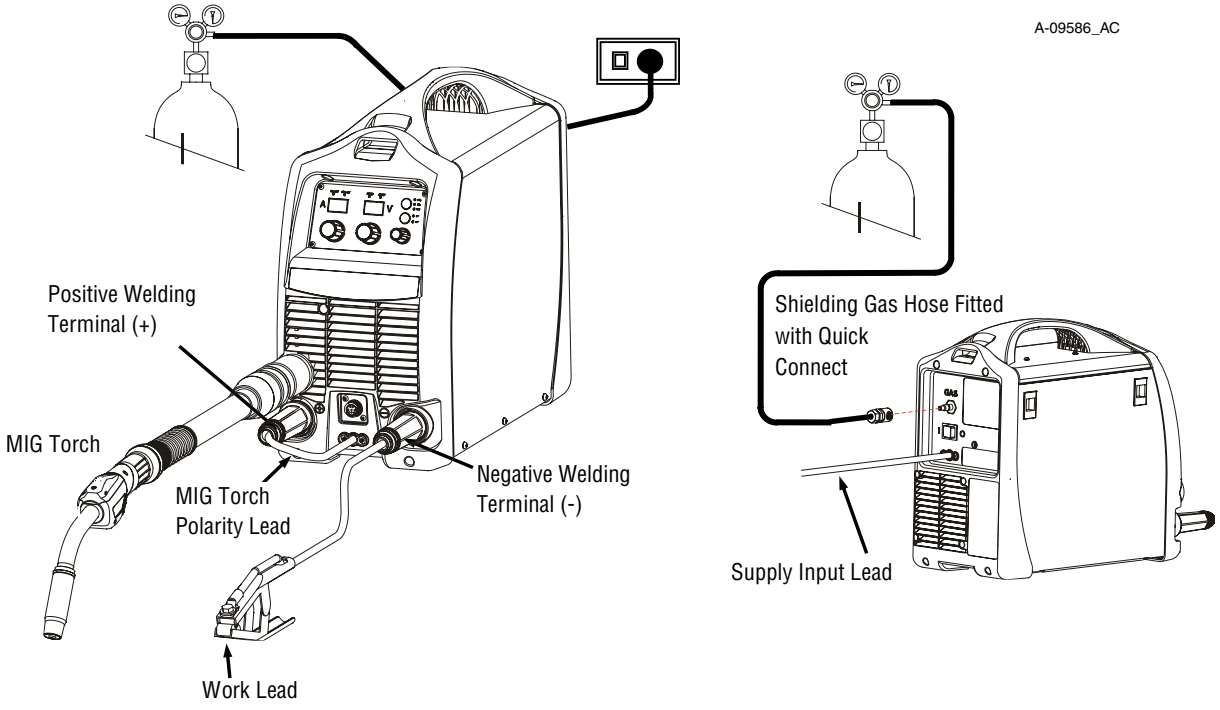


Figure 4-13: Setup for MIG Welding with Gas Shielded MIG Wire

4.10 Setup for MIG (GMAW) Welding with Gasless MIG Wire

A. Select MIG mode with the process selection control (refer to Section 4.01.12 for further information).

B. Connect the MIG Torch polarity lead to the negative welding terminal (-). If in doubt, consult the electrode wire manufacturer. Welding current flows from the power source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.

C. Connect the work lead to the positive welding terminal (+). If in doubt, consult the electrode wire manufacturer. Welding current flows from the power source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.

D. Refer to the Weld Guide located on the inside of the wirefeed compartment door for further information.

WARNING

Before connecting the work clamp to the work make sure the mains power supply is switched off.

CAUTION

Loose welding terminal connections can cause overheating and result in the male plug being fused in the terminal.

Remove any packaging material prior to use. Do not block the air vents at the front or rear of the Welding Power Source.

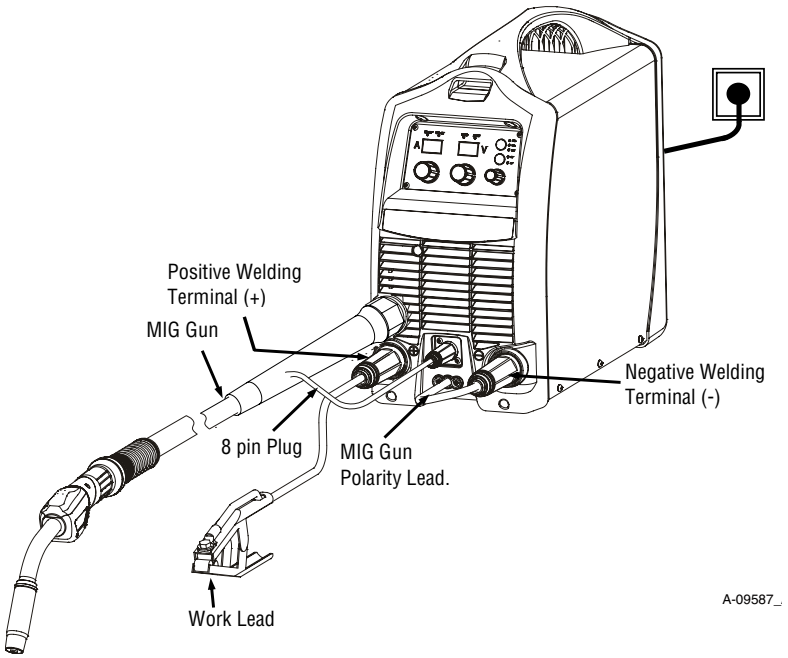


Figure 4-14: Setup for MIG Welding with Gasless MIG Wire

4.11 Setup for TIG (GTAW) Welding

A. Select Lift TIG mode with the process selection control (refer to Section 4.01.12 for further information).

B. Connect the TIG Torch to the negative welding terminal (-). Welding current flows from the power source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.

C. Connect the work lead to the positive welding terminal (+). Welding current flows from the Power Source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.

D. Connect the TIG torch trigger switch via the 8 pin socket located on the front of the power source as shown below. The TIG torch will require a trigger switch to operate in Lift TIG Mode.

NOTE

If the TIG torch has a remote TIG torch current control fitted then it will require to be connected to the 8 pin socket. (Refer to section 4.01.8 Remote Control Socket for further information).

E. Fit the welding grade shielding gas regulator/flowmeter to the shielding gas cylinder then connect the shielding gas hose from the TIG torch to the regulator/flowmeter outlet. Note that the TIG torch shielding gas hose is connected directly to the regulator/flowmeter. The power source is not fitted with a shielding gas solenoid to control the gas flow in TIG mode therefore the TIG torch will require a gas valve.

WARNING

Before connecting the work clamp to the work and inserting the electrode in the TIG Torch make sure the mains power supply is switched off.

Secure the welding grade shielding gas cylinder in an upright position by chaining it to a stationary support to prevent falling or tipping.

CAUTION

Remove any packaging material prior to use. Do not block the air vents at the front or rear of the Welding Power Source.

Loose welding terminal connections can cause overheating and result in the male plug being fused in the terminal.

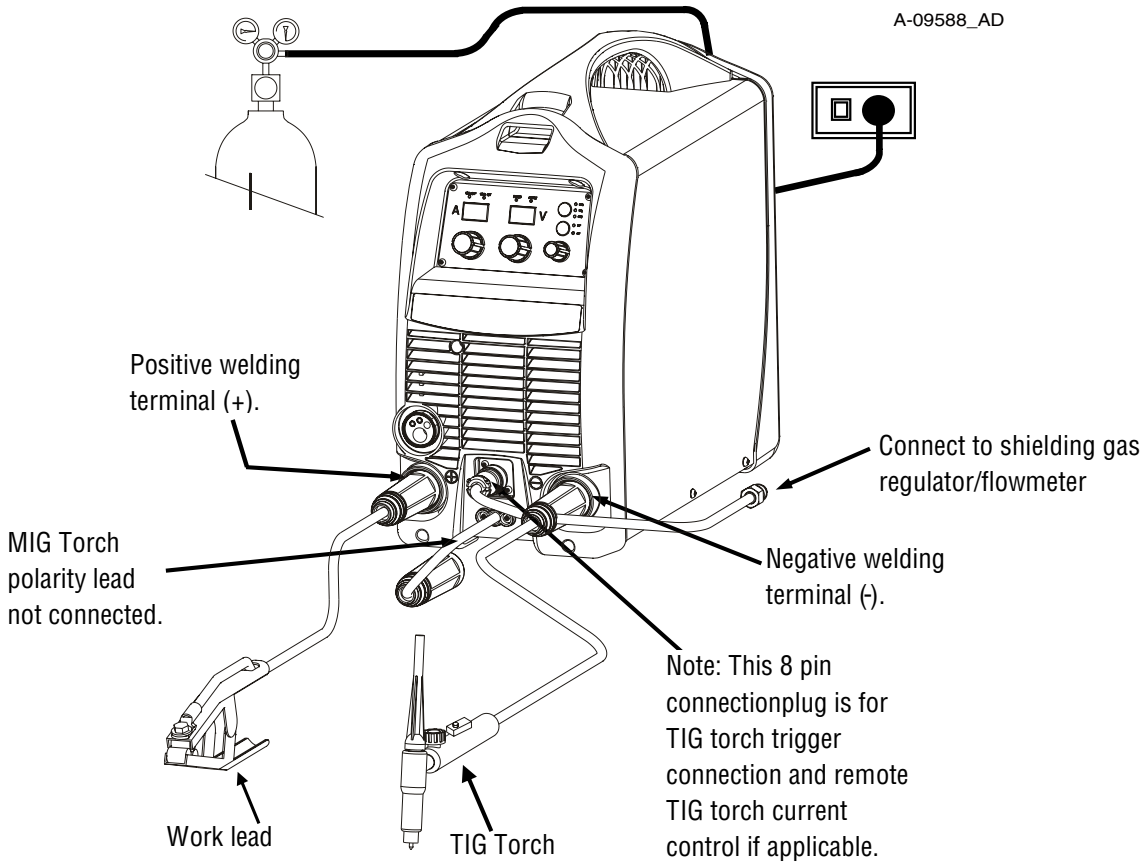
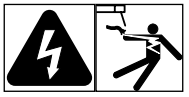


Figure 4-15: Setup for TIG Welding

4.12 Setup for Manual Arc (MMA) Welding

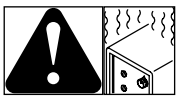
A. Connect the Electrode Holder lead to the positive welding terminal (+). If in doubt, consult the electrode manufacturer. Welding current flows from the Power Source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.

B. Connect the work lead to the negative welding terminal (-). If in doubt, consult the electrode manufacturer. Welding current flows from the power source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.



WARNING

Before connecting the work clamp to the work and inserting the electrode in the electrode holder make sure the mains power supply is switched off.



CAUTION

Remove any packaging material prior to use. Do not block the air vents at the front or rear of the Welding Power Source.

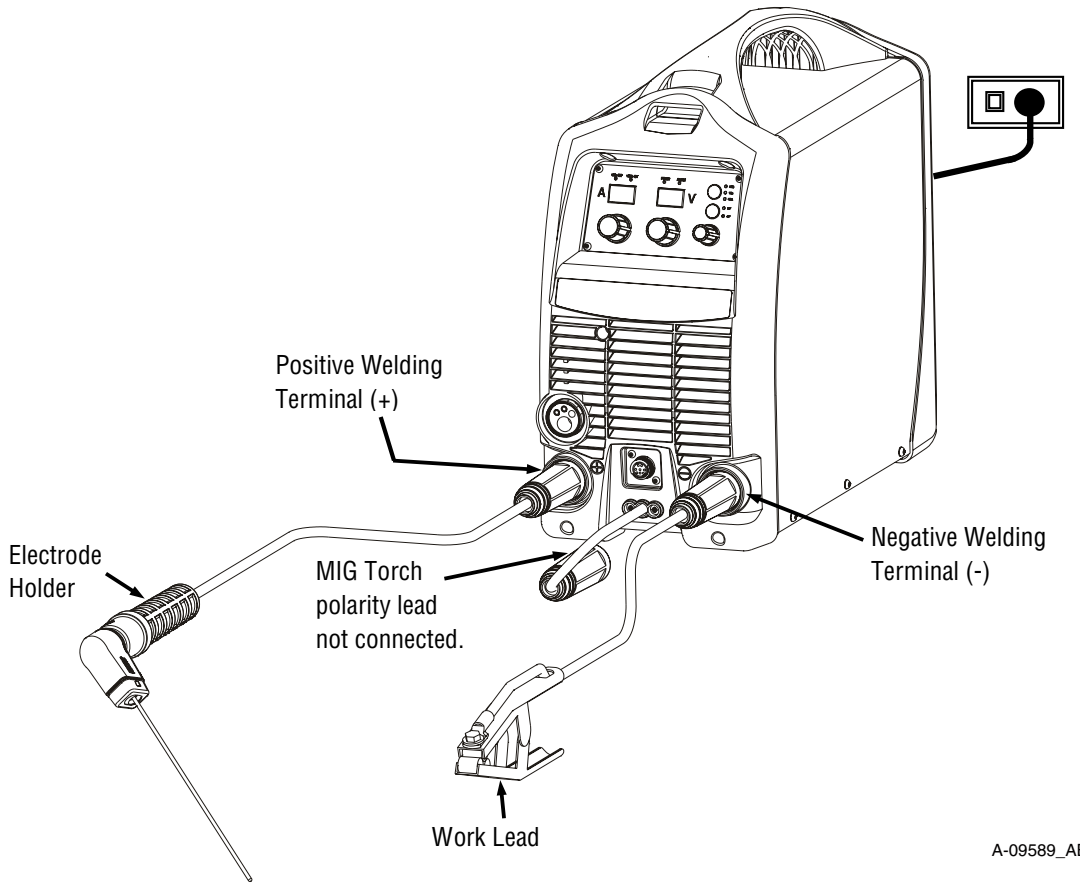


Figure 4-16: Setup for Manual Arc Welding.

4.13 Leak Testing the System

Leak test the system before putting into operation.

1. Be sure that there is a valve in the downstream equipment to turn off the gas flow.
2. With the cylinder valve open, adjust the regulator to deliver the maximum required delivery flow rate.
3. Close the cylinder valve. Watch to see if the high pressure or contents gauge drops, if it does you have a leak in the connection between the regulator and the cylinder.
4. Once leak testing has been performed and there are no leaks in the system, slowly open the cylinder valve and proceed.

WARNING

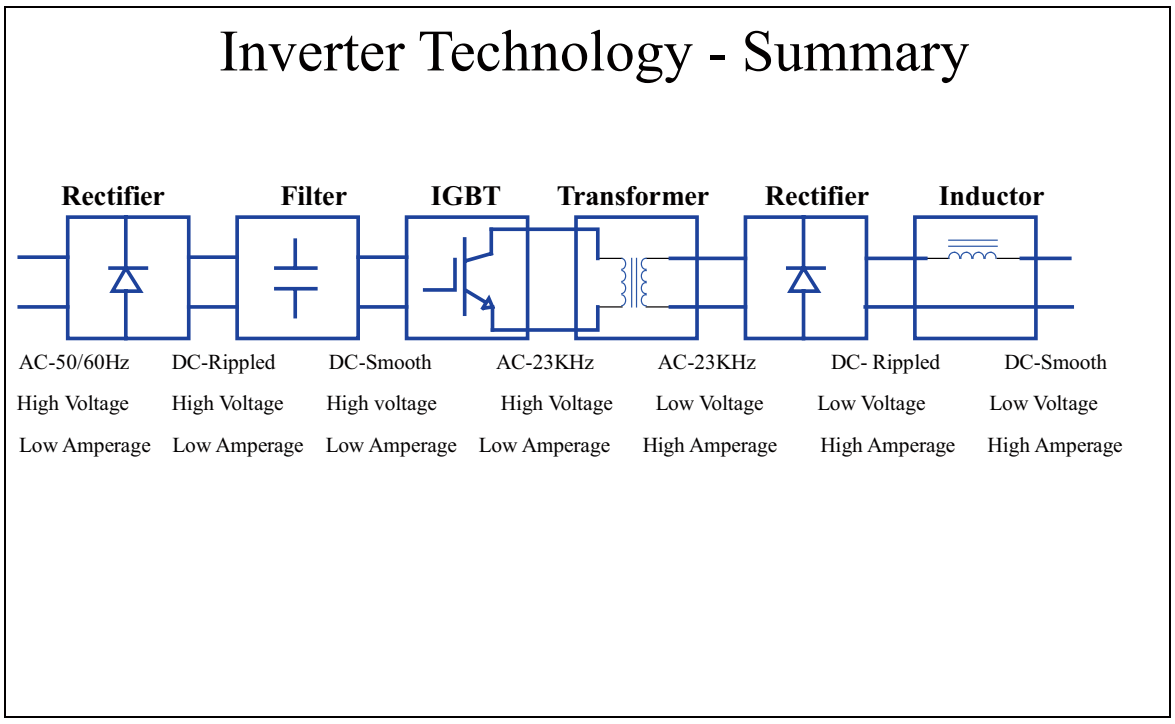
If a leak has been detected anywhere in the system, discontinue use and have the system repaired. DO NOT use leaking equipment. Do not attempt to repair a leaking system while the system is under pressure.

SECTION 5:
THEORY OF OPERATION

5.01 Inverter Design

What does the word inverter mean?

The term inverter refers to the ability to change DC power into AC. Inverter power supplies immediately rectify the incoming AC to DC, and then the transistors create a higher frequency AC. The higher frequency AC then goes on to a much smaller main transformer than in a conventional power supply. The AC is then rectified to extremely smooth DC. The diagram to the below shows the basic electrical wiring of a DC output inverter power supply.



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Notes

SECTION 6: TROUBLESHOOTING

6.01 Basic Troubleshooting-Power Source Faults

The following table is a guide for analysing problems and making repairs to the Power Source.

Fault		Possible Cause		Remedy	
1	There is no weld output and all front panel displays are off	A	The main Power Switch is set to OFF	A	Set main Power Switch to ON
		B	Line fuse is blown	B	Replace Line fuse
		C	The main Power Switch is faulty	C	Replace main Power Switch
		D	Loose connection to EMC board	D	Tighten connections
		E	Faulty Power Inverter board	E	Replace Power Inverter board
		F	Faulty Control board	F	Replace Control board
		G	Faulty Display board	G	Replace Display board
2	There is no weld output and all front panel displays are off or flickering on & off	A	The internal protection circuit to shut the unit down if the mains supply voltage is too high has operated	A	Check to see if mains supply voltage is <274VAC. A generator with poor voltage regulation may cause a supply voltage in excess of 274VAC. Connect Power Source to a supply voltage <274VAC.
3	There is no weld output and the yellow over temperature light is on	A	Unit has overheated	A	Allow unit to cool with fan running until over temperature light extinguishes
		B	Airflow inlet or outlet ducts are blocked	B	Remove blockages from airflow ducts
		C	Fan does not operate	C	Replace fan. Check fan wiring header is plugged securely into Control board. Check fan wiring is not damaged
4	Mode switch does not change welding mode	A	Faulty Display board	A	Replace Display board
5	The wirefeed motor and the weld output do not operate when the torch trigger switch is depressed	A	Internal wiring fault	A	Check continuity of internal wiring from Torch adaptor through to boards
		B	Over temperature light is on	B	Allow unit to cool
		C	Power Source set to REMOTE	C	Set switch to LOCAL
		D	Trigger wires shorted to weld voltage inside torch	D	Repair trigger wires in torch
		E	Trigger wires or torch switch faulty	E	Check & Repair
		F	Faulty Power Inverter board	F	Replace Power Inverter board
		G	Faulty Control board	G	Replace Control board
		H	Faulty Display board	H	Replace Display board
6	The wirefeed motor does not operate when the torch trigger switch is depressed	A	Power Source set to TIG or STICK mode	A	Set power Source to MIG mode Check motor wiring
		B	Wirefeeder motor wiring has become loose	B	Check & Repair
		C	Trigger wires or torch switch faulty	C	Replace Power Inverter board
		D	Faulty Power Inverter board	D	
7	The wirefeed motor operates at maximum speed and cannot be adjusted.	A	Faulty Power Inverter board	A	Replace Power Inverter board
		B	Faulty Display board	B	Replace Display board

Table 6-1 Power Source Faults

The following table is a guide for analysing problems and making repairs to the Power Source

	Fault		Possible Cause		Remedy
8	Wirefeed motor operates when the torch trigger switch is depressed but the gas valve does not operate.	A	Internal wiring fault	A	Check solenoid wiring header is plugged securely into Control board. Check solenoid wiring is not damaged
		B	Faulty Solenoid	B	Replace Solenoid
		C	Impurity in gas system causing solenoid to stay open or closed	C	Clean out gas system. Disassemble solenoid & clean out impurities
		D	Faulty Power Inverter board	D	Replace Power Inverter board
		E	Faulty Control board	E	Replace Control board
9	A welding arc can be established but the weld is erratic or inconsistent	A	Work Lead cable too small	A	Use correct weld cable size
		B	Loose welding connections	B	Tighten welding connections
		C	Loose earth clamp	C	Tighten earth clamp
		D	Incorrect weld polarity selected	D	Correct weld polarity. Refer to weld consumable manufacturers recommended polarity
		E	No shielding gas	E	Connect shielding gas
		F	Wind blows shielding gas away	F	Shield welding area from draughts
		G	Incorrect TIG tungsten electrode	G	Use correct tungsten type
		H	Poorly prepared or worn TIG tungsten	H	Regrind tungsten to correct shape

Table 6-2 Power Source Faults

6.02 Checking Unit Before Applying Power

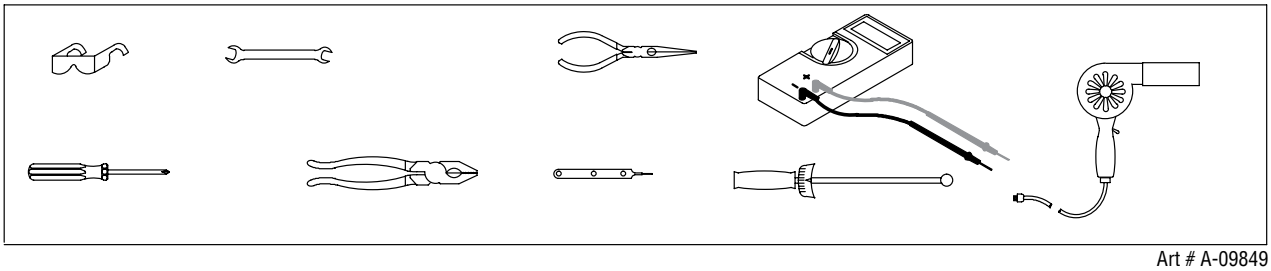
Turn SW1 to OFF position, and disconnect unit from primary line voltage before working on unit.

Significant DC voltage can remain on capacitors after unit is Off. Wait until all front panel LED's are off before removing case.

Check DC bus voltage according to Section 6.07 after removing case.

Before troubleshooting or applying power to unit, complete the following checks to avoid causing further damage.

6.03 Tools Needed for Troubleshooting and Servicing



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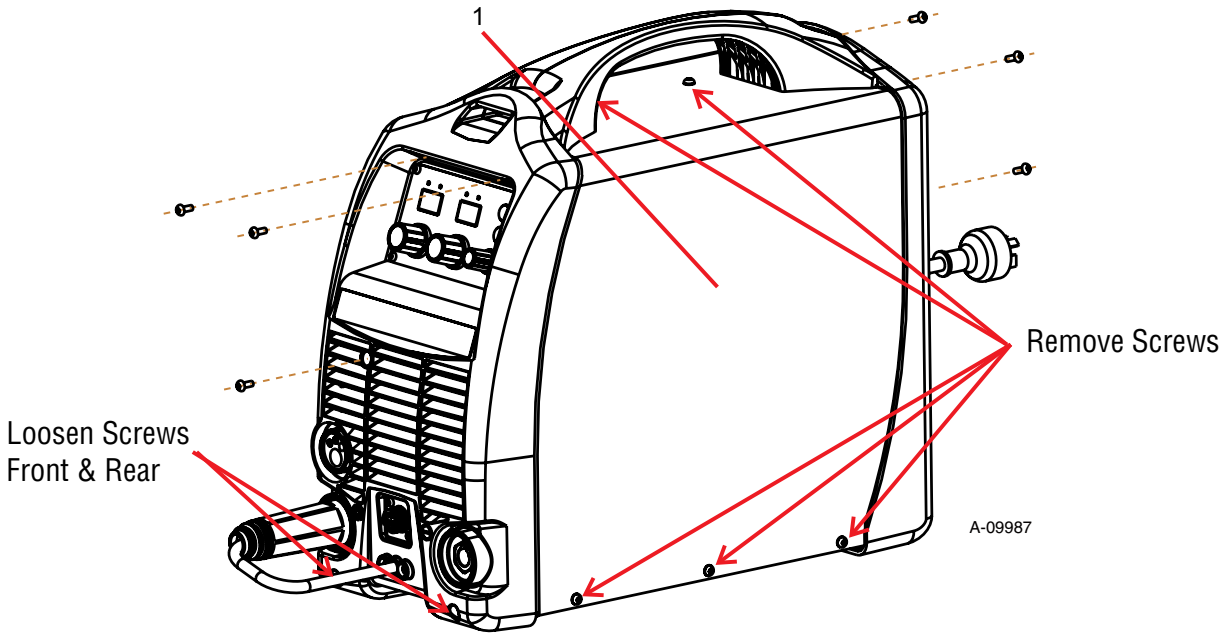
6.04 Case Removal

Read and follow safety information in Section 6.02 before proceeding.

1. Cover



a) Remove the two top screws from the front & rear mouldings.

b) Remove the centre screws from the front & rear mouldings.

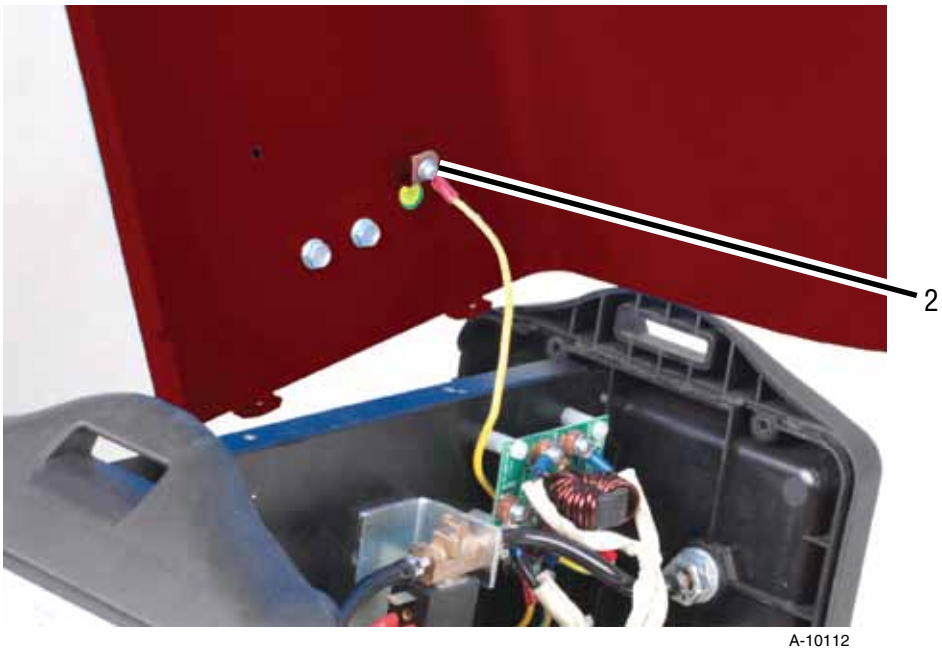
c) Loosen slightly the two bottom screws from the front & rear mouldings.

d) Remove the three bottom screws and the two top screws securing the cover panel.

e) Gently lever apart the front & rear mouldings & remove the cover panel.

2. Ground screw

- Carefully lift the case to access and remove the screw which connects the ground wire to the cover.

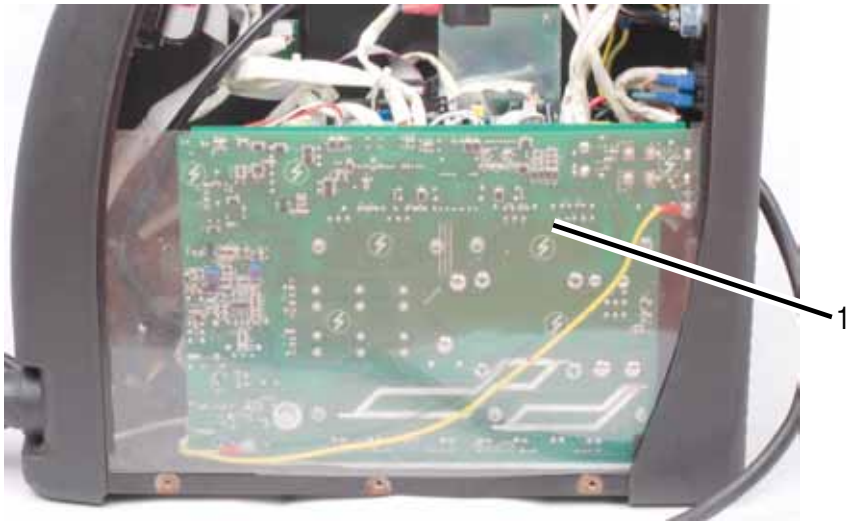


6.05 Clear Cover Sheet Removal

Read and follow safety information in Section 6.02 before proceeding.

1. Clear protective sheet

Take out clear protective sheet.



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6.06 Visually Inspect

Visually inspect the inside of the Power Source. The levels of current present in these units can cause burning or arcing of PCB, transformers, switches, or rectifier when a failure occurs. Carefully inspect all components within these units.

Look in particular for the following:

a) Loose or broken wires or connectors.

b) Burned or scorched parts or wires or evidence of arcing.

c) Any accumulation of metal dust or filings that may have caused shorting or arcing.

If any parts are damaged, they must be replaced. Refer to the Spare Parts section for a complete list of components used in the Power Source.

Locate the faulty component(s) then replace where necessary.

6.07 Preliminary DC Bus measurement of the main inverter board

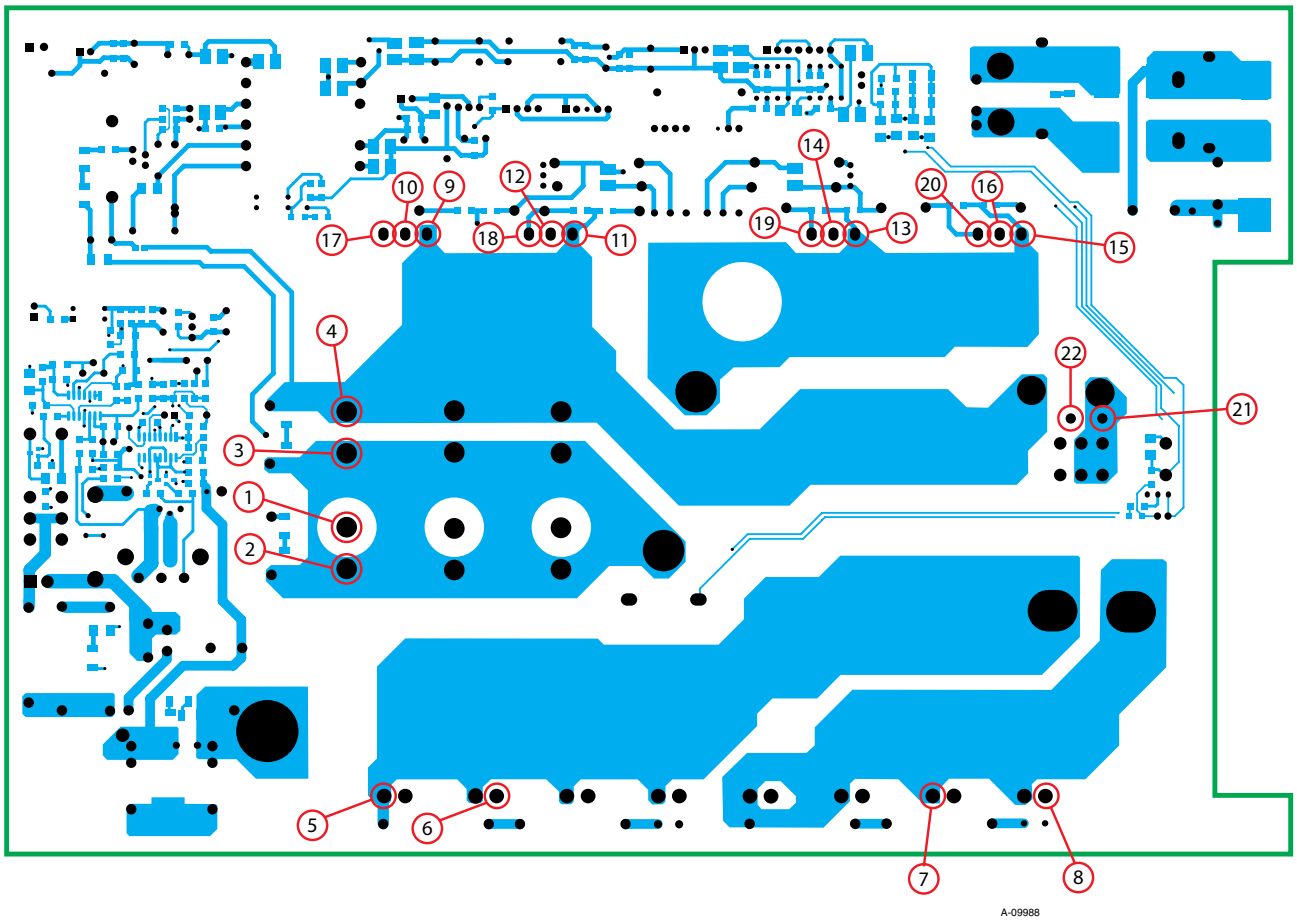
Read and follow safety information in Section 6.02 before proceeding.

DC Bus Testing	Multimeter Lead Placement	Voltage with Supply voltage OFF
Upper capacitor bank	Positive meter lead to testpoint 1 Negative meter lead to testpoint 2	0 VDC
Lower capacitor bank	Positive meter lead to testpoint 3 Negative meter lead to testpoint 4	0 VDC

Table 6-3 DC BUS, Multimeter set to measure DC volts

6.08 Preliminary check of the main inverter board

Read and follow safety information in Section 6.02 before proceeding.



Output Diode Testing	Multimeter Lead Placement	Diode Voltage
Left Output Diodes	Positive meter lead to testpoint 5 Negative meter lead to testpoint 6	0.2 – 0.8 VDC
Right Output Diodes	Positive meter lead to testpoint 7 Negative meter lead to testpoint 8	0.2 – 0.8 VDC

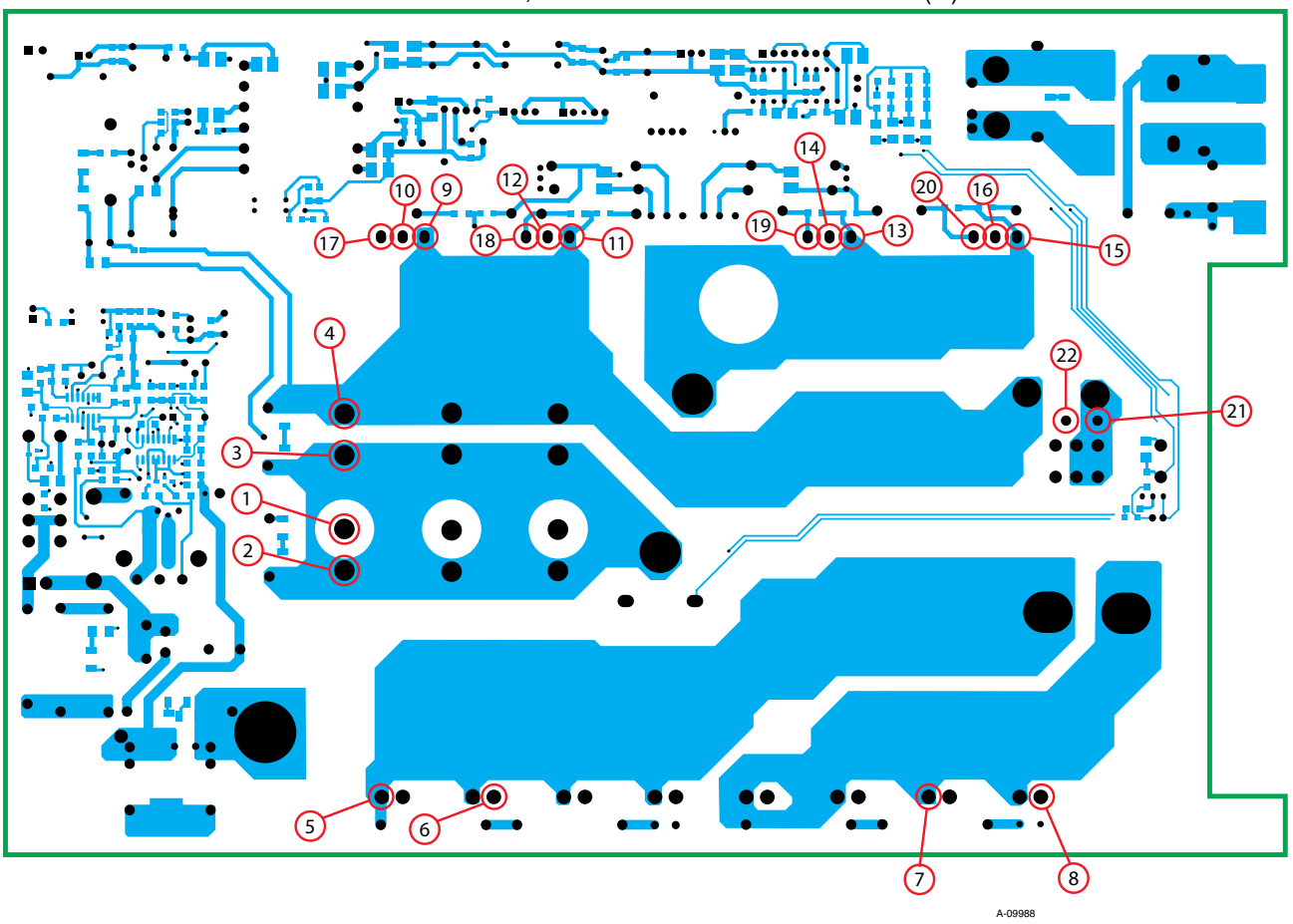
Table 6-4 Output Diodes, Multimeter set to measure Diode Voltage

IGBT Testing	Multimeter Lead Placement	Diode Voltage
IGBT 1	Positive meter lead to testpoint 9 Negative meter lead to testpoint 10	0.2 – 0.8 VDC
IGBT 2	Positive meter lead to testpoint 11 Negative meter lead to testpoint 12	0.2 – 0.8 VDC
IGBT 3	Positive meter lead to testpoint 13 Negative meter lead to testpoint 14	0.2 – 0.8 VDC
IGBT 4	Positive meter lead to testpoint 15 Negative meter lead to testpoint 16	0.2 – 0.8 VDC

Table 6-5 IGBT's, Multimeter set to measure Diode Voltage

IGBT Testing	Multimeter Lead Placement	Impedance
IGBT 1	Positive meter lead to testpoint 17 Negative meter lead to testpoint 9	150 to 350 Ω
IGBT 2	Positive meter lead to testpoint 18 Negative meter lead to testpoint 11	150 to 350 Ω
IGBT 3	Positive meter lead to testpoint 19 Negative meter lead to testpoint 13	150 to 350 Ω
IGBT 4	Positive meter lead to testpoint 20 Negative meter lead to testpoint 15	150 to 350 Ω

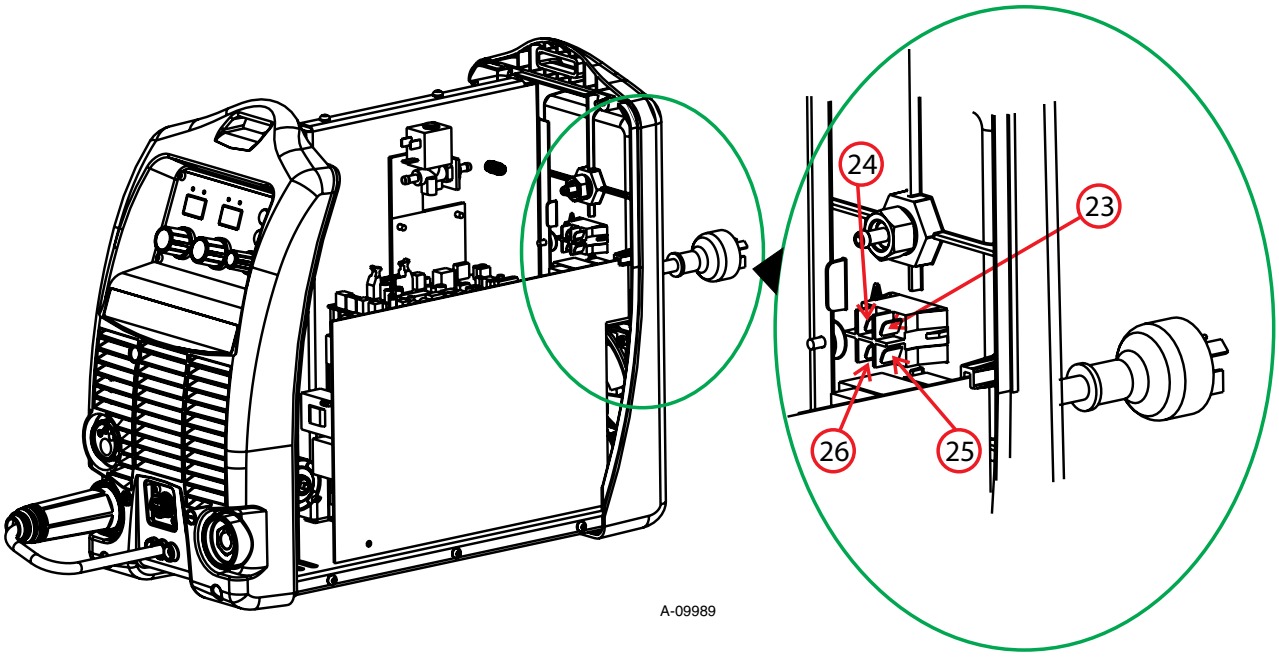
Table 6-6 IGBT's, Multimeter set to measure ohms (Ω)



Inrush PTC	Multimeter Lead Placement	Impedance
PTC	Positive meter lead to testpoint 21 Negative meter lead to testpoint 22	0 to 100 Ω

Table 6-7 Inrush PTC, Multimeter set to measure ohms (Ω)

6.09 Check main On / Off Switch



Power Switch Testing	Multimeter Lead Placement	Impedance
Switch ON	Positive meter lead to testpoint 23 Negative meter lead to testpoint 24	0 to 1 Ω
Switch ON	Positive meter lead to testpoint 25 Negative meter lead to testpoint 26	0 to 1 Ω
Switch OFF	Positive meter lead to testpoint 23 Negative meter lead to testpoint 24	> 1k Ω
Switch OFF	Positive meter lead to testpoint 25 Negative meter lead to testpoint 26	> 1k Ω

Table 6-8 Power Switch, Multimeter set to measure ohms (Ω)

6.10 Check main input rectifier

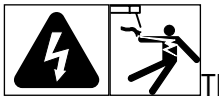
Input Rectifier Testing	Multimeter Lead Placement	Diode Voltage
AC1 to DC+	Positive meter lead to AC1 Negative meter lead to testpoint DC+	0.2 – 0.8 VDC
AC2 to DC+	Positive meter lead to AC2 Negative meter lead to testpoint DC+	0.2 – 0.8 VDC
AC1 to DC-	Positive meter lead to testpoint DC- Negative meter lead to testpoint AC1	0.2 – 0.8 VDC
AC2 to DC-	Positive meter lead to testpoint DC- Negative meter lead to testpoint AC2	0.2 – 0.8 VDC

Table 6-9 IGBT's, Multimeter set to measure Diode Voltage

Measurements may be made directly onto the main input rectifier. AC1 and AC2 may be measured from the pins on the mains supply plug with the main power switch set to the ON position.

6.11 DC Bus voltage measurement

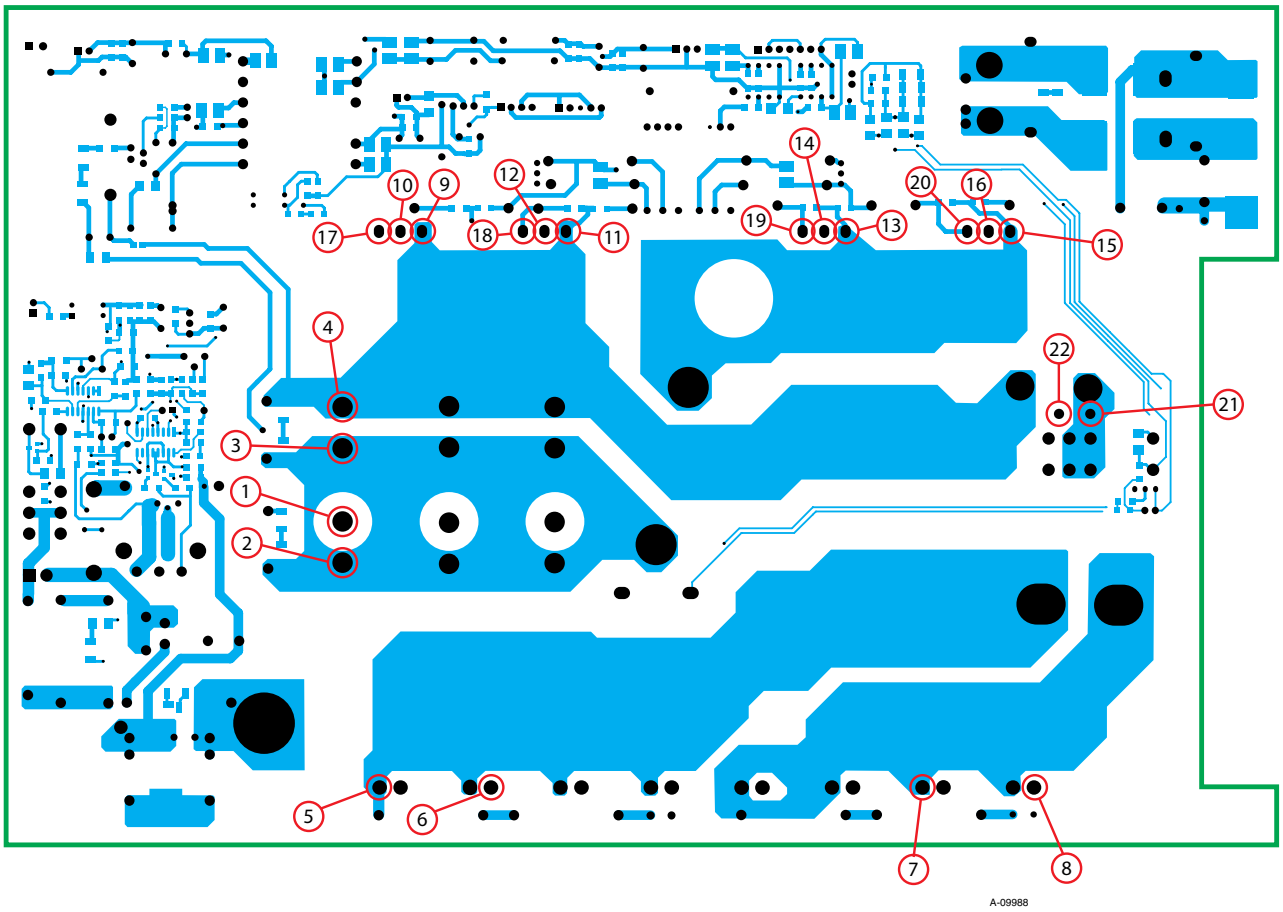
Apply voltage to the Power Source.



There are extremely dangerous voltage and power levels present inside these Power Sources. Do not attempt to diagnose or repair unless you have had training in power electronics measurement and troubleshooting techniques.

Once power is applied to the Power Source, there are extremely hazardous voltage and power levels present.

Do not touch any live parts.



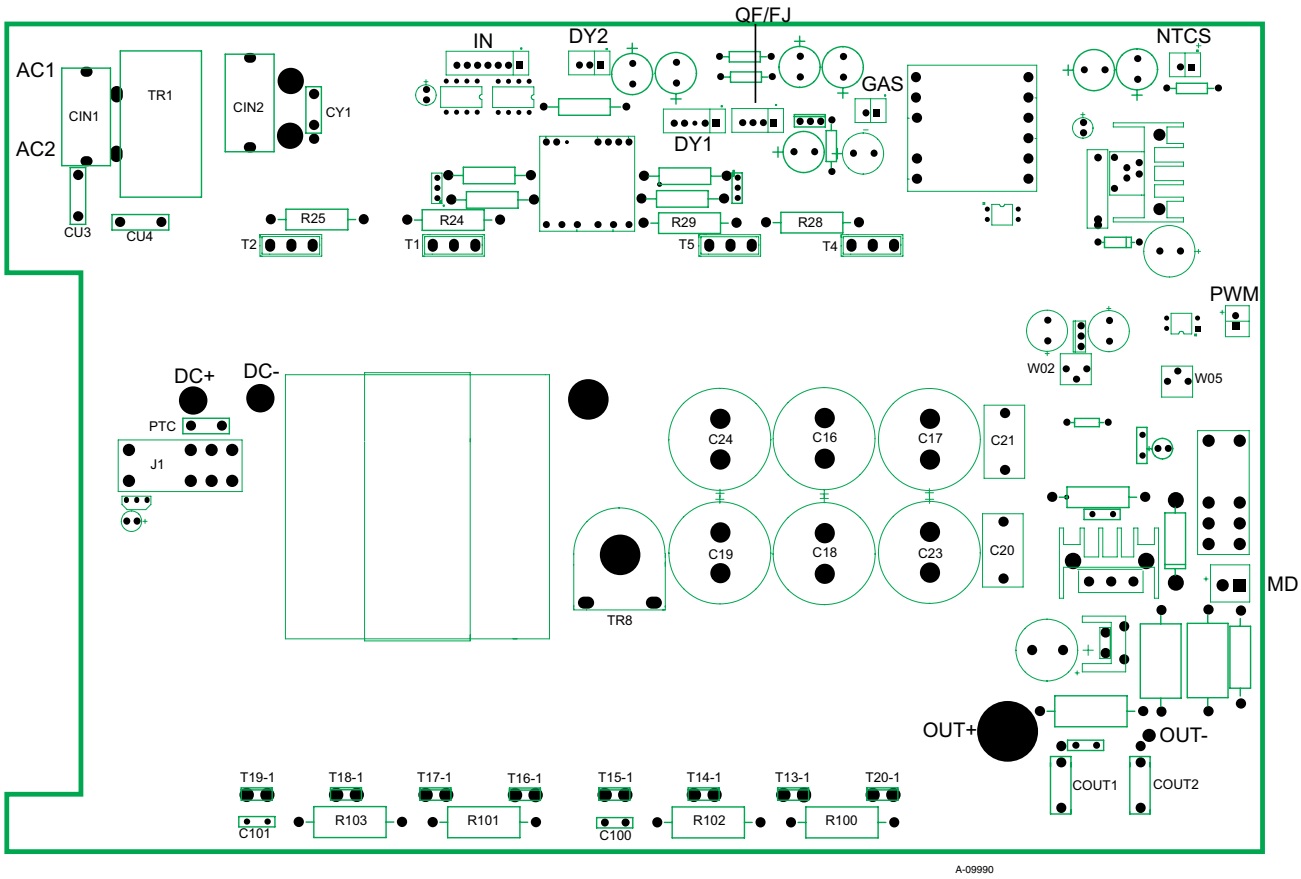
DC Bus Testing	Multimeter Lead Placement	Voltage with Supply voltage OFF
Upper capacitor bank	Positive meter lead to testpoint 1 Negative meter lead to testpoint 2	161 VDC +/-10%
Lower capacitor bank	Positive meter lead to testpoint 3 Negative meter lead to testpoint 4	161 VDC +/-10%
Overall capacitor bank	Positive meter lead to testpoint 1 Negative meter lead to testpoint 4	322 VDC +/-10%

Table 6-10 DC BUS, Multimeter set to measure DC volts

Note: These DC voltages are at nominal mains supply voltage of 230VAC.

6.12 PCB Connectors

1 Inverter PCB



IN Header Pin	Pin function	Signal
1	+15V	15 VDC
2	IGBT 1 pwm drive signal, 15V p-p square wave	15 VDC pk
3	IGBT 2 pwm drive signal, 15V p-p square wave	15 VDC pk
4	IGBT 2 pwm drive signal, 15V p-p square wave	15 VDC pk
5	IGBT 1 pwm drive signal, 15V p-p square wave	15 VDC pk
6	Rectified secondary of current transformer TR8	15 VDC pk
7	0V	0 VDC

Table 6-11 IN Header pin function (connects to DRIVE header on control PCB)

PWM Header Pin	Pin function	Signal
1	0VDC	0 VDC
2	Motor pwm drive signal	5 VDC pk

Table 6-12 PWM Header pin function (connects to PWM header on control PCB)

MD Header Pin	Pin function	Signal
1	Motor positive	24 VDC
2	Motor negative	0 VDC

Table 6-13 MD Header pin function (connects to motor)

NTCS Header Pin	Pin function	Signal
1	+24V	24 VDC
2	0V	0 VDC

Table 6-14 NTCS Header pin function (connects to NTCS header on control PCB)

DY2 Header Pin	Pin function	signal
1	+24V	24 VDC
2	0V	0 VDC
3	-24V	-24 VDC

Table 6-15 DY2 Header pin function (connects to SOURCE header on control PCB)

DY1 Header Pin	Pin function	signal
1	+24V (solenoid positive)	24 VDC
2	0V	0V
3	No connection	n/c
4	+24V (solenoid positive)	24 VDC
5	Solenoid negative	0 VDC

Table 6-16 DY1 Header pin function

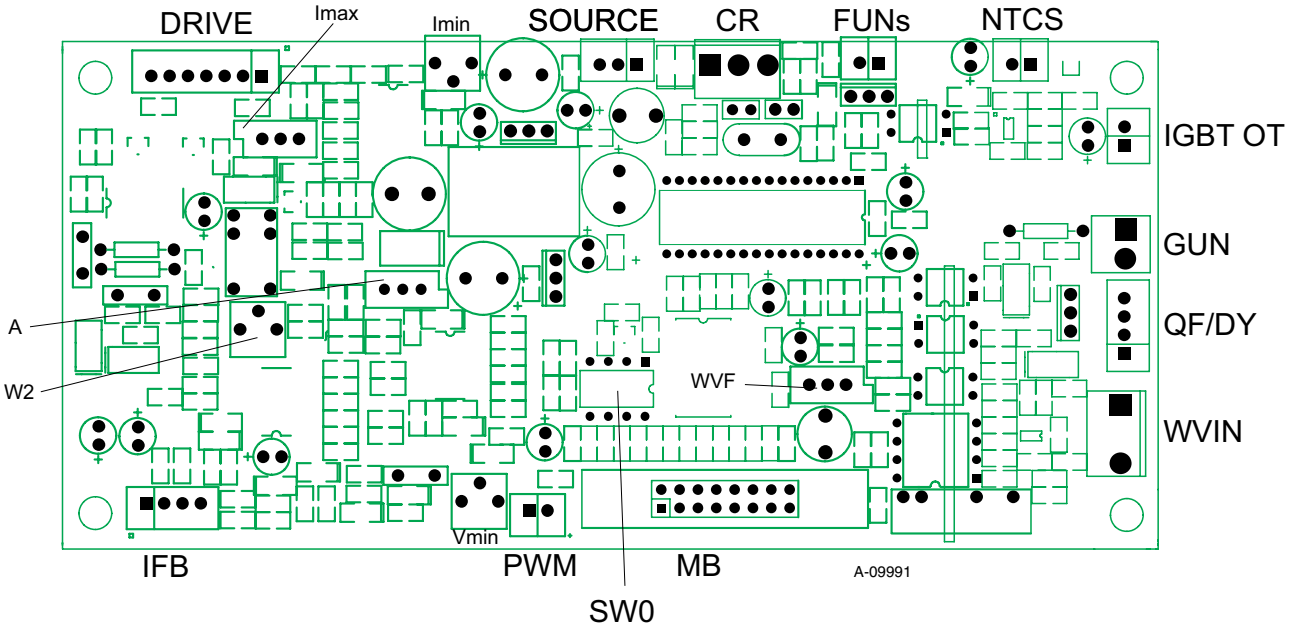
QF/FJ Header Pin	Pin function	signal
1	+24V (VRD positive, South Pacific Version Only)	24 VDC
2	Solenoid negative	0 VDC
3	+24V (solenoid positive)	24 VDC
4	0V	0 VDC

Table 6-17 QF/FJ Header pin function (Connects to QF/DY header on control PCB)

GAS Header Pin	Pin function	signal
1	+24V (solenoid positive)	24 VDC
2	Solenoid negative	0 VDC

Table 6-18 GAS Header pin function (connects to Solenoid)

2 Control PCB



GUN Header Pin	Pin function	Signal
1	+24V trigger positive (0V when trigger closed)	24 VDC
2	0VDC	0 VDC

Table 6-19 GUN Header pin function (connects to GUN header on display PCB)

PWM Header Pin	Pin function	Signal
1	0VDC	0 VDC
2	Motor pwm drive signal	5 VDC pk

Table 6-20 PWM Header pin function (connects to PWM header on inverter PCB)

QF/DY Header Pin	Pin function	Signal
1	+24V (VRD positive, South Pacific Version Only)	24 VDC
2	Solenoid negative	0 VDC
3	+24V (solenoid positive)	24 VDC
4	0V	0 VDC

Table 6-21 QF/FJ Header pin function (Connects to QF/FJ header on inverter PCB)

FUNs Header Pin	Pin function	Signal
1	+24V (Fan positive)	24 VDC
2	0V (Fan negative) when fan is on	0 VDC

Table 6-22 FUNs Header pin function (not used)

DRIVE Header Pin	Pin function	Signal
1	+15V	15 VDC
2	IGBT 1 pwm drive signal, 15V p-p square wave	15 VDC pk
3	IGBT 2 pwm drive signal, 15V p-p square wave	15 VDC pk
4	IGBT 2 pwm drive signal, 15V p-p square wave	15 VDC pk
5	IGBT 1 pwm drive signal, 15V p-p square wave	15 VDC pk
6	Rectified secondary of current transformer TR8	15 VDC pk
7	0V	0 VDC

Table 6-23 DRIVE Header pin function (connects to IN header on inverter PCB)

WVIN Header Pin	Pin function	Signal
1	Positive welding terminal	positive VDC
2	No connection	n/c
3	Negative welding terminal	0 VDC

Table 6-24 WVIN Header pin function

IFB Header Pin	Pin function	Signal
1	+15V	15 VDC
2	-15V	-15 VDC
3	Current sensor signal	
4	0V	0 VDC

Table 6-25 IFB Header pin function (Connects to welding output current sensor)

SOURCE Header Pin	Pin function	Signal
1	+24V	24 VDC
2	0V	0 VDC
3	-24V	-24 VDC

Table 6-26 SOURCE Header pin function (connects to DY2 header on control PCB)

CR Header Pin	Pin function	Signal
1	+5V	5 VDC
2	Wiper 10k Burnback potentiometer	0 – 5 VDC
3	0V	0 VDC

Table 6-27 CR Header pin function (connects to 10k Burnback potentiometer)

IGBT OT Header Pin	Pin function	signal
1	Igbt thermostat (0VDC when thermostat closed)	VDC
2	0V	0 VDC

Table 6-28 IGBT OT Header pin function (connects to igbt thermostat)

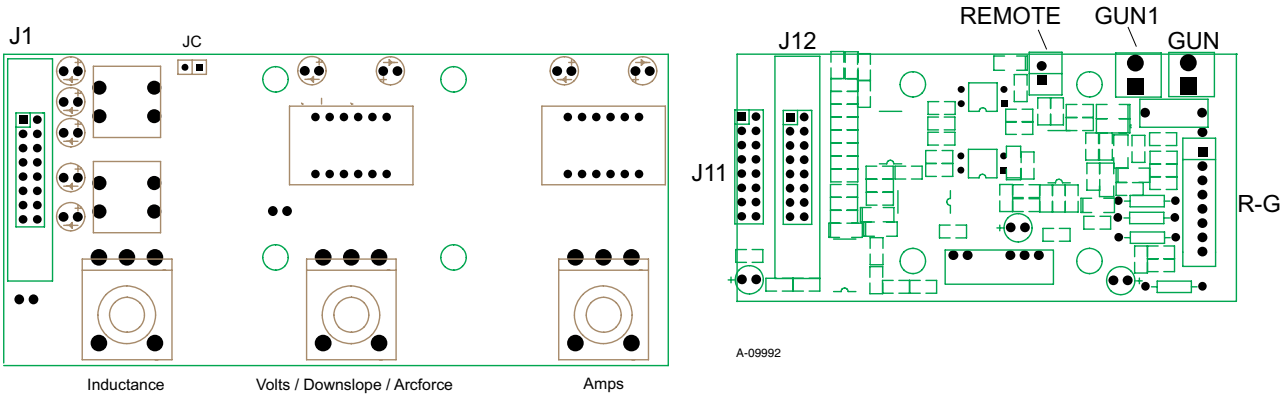
NTCS Header Pin	Pin function	Signal
1	+24V	24 VDC
2	0V	0 VDC

Table 6-29 NTCS Header pin function (connects to NTCS header on inverter PCB)

MB Header Pin	Pin function	Signal
1	Serial display data & eprom (D-IN)	5 VDC digital
2	Serial display data (LOAD)	5 VDC digital
3	Serial display data (CLK)	5 VDC digital
4	2T/4T pushbutton (0V when button pushed)	0VDC
5	Serial display eprom (D-OUT)	5 VDC digital
6	Stick mode (used for remote / local)	
7	Chip select	5 VDC digital
8	MODE pushbutton (0V when button pushed)	0VDC
9	15VDC	15 VDC
10	Remote / Local switch	
11	Inductance pot terminal 2	
12	Volts setpoint	0 – 5 VDC
13	Inductance pot terminal 1	
14	Amps setpoint	0 – 5 VDC
15	5VDC	5 VDC
16	0V	0 VDC

Table 6-30 MB Header pin function (connects to J12 header on display PCB)

3 Display PCB



GUN Header Pin	Pin function	Signal
1	+24V trigger positive (0V when trigger closed)	24 VDC
2	0VDC	0 VDC

Table 6-31 GUN Header pin function (connects to GUN header on control PCB)

GUN1 Header Pin	Pin function	Signal
1	+24V trigger positive (0V when trigger closed)	24 VDC
2	0VDC	0 VDC

Table 6-32 GUN Header pin function (connects to front panel torch trigger terminals)

REMOTE Header Pin	Pin function	Signal
1	Remote switch	
2	Remote switch	

Table 6-33 REMOTE Header pin function (connects to remote switch)

J1 & J11 Header Pin	Pin function	Signal
1	Serial display data & eprom (D-IN)	5 VDC digital
2	Serial display data (LOAD)	5 VDC digital
3	Serial display data (CLK)	5 VDC digital
4	2T/4T pushbutton (0V when button pushed)	0VDC
5	Serial display eprom (D-OUT)	5 VDC digital
6	Stick mode (used for remote / local)	
7	Chip select	5 VDC digital
8	MODE pushbutton (0V when button pushed)	0VDC
9	15VDC	15 VDC
10	Remote / Local switch	
11	Inductance pot terminal 2	
12	Volts setpoint	0 – 5 VDC
13	Inductance pot terminal 1	
14	Amps setpoint	0 – 5 VDC
15	5VDC	5 VDC
16	0V	0 VDC

Table 6-34 J1 Header pin function (connects to J11 header on display PCB)

R-G Header Pin	Pin function	Signal
1	No connection Fabricator 181i Spool gun motor negative for Fabricator 141i & 181i)	
2	+24V trigger positive (0V when trigger closed)	24 VDC
3	0VDC	0 VDC
4	No connection Fabricator 181i Spool gun motor positive for Fabricator 141i & 181i)	
5	-12VDC	-12 VDC
6	+12VDC	+12 VDC
7	Remote amps	-12 to +12 VDC
8	Remote volts	-12 to +12 VDC

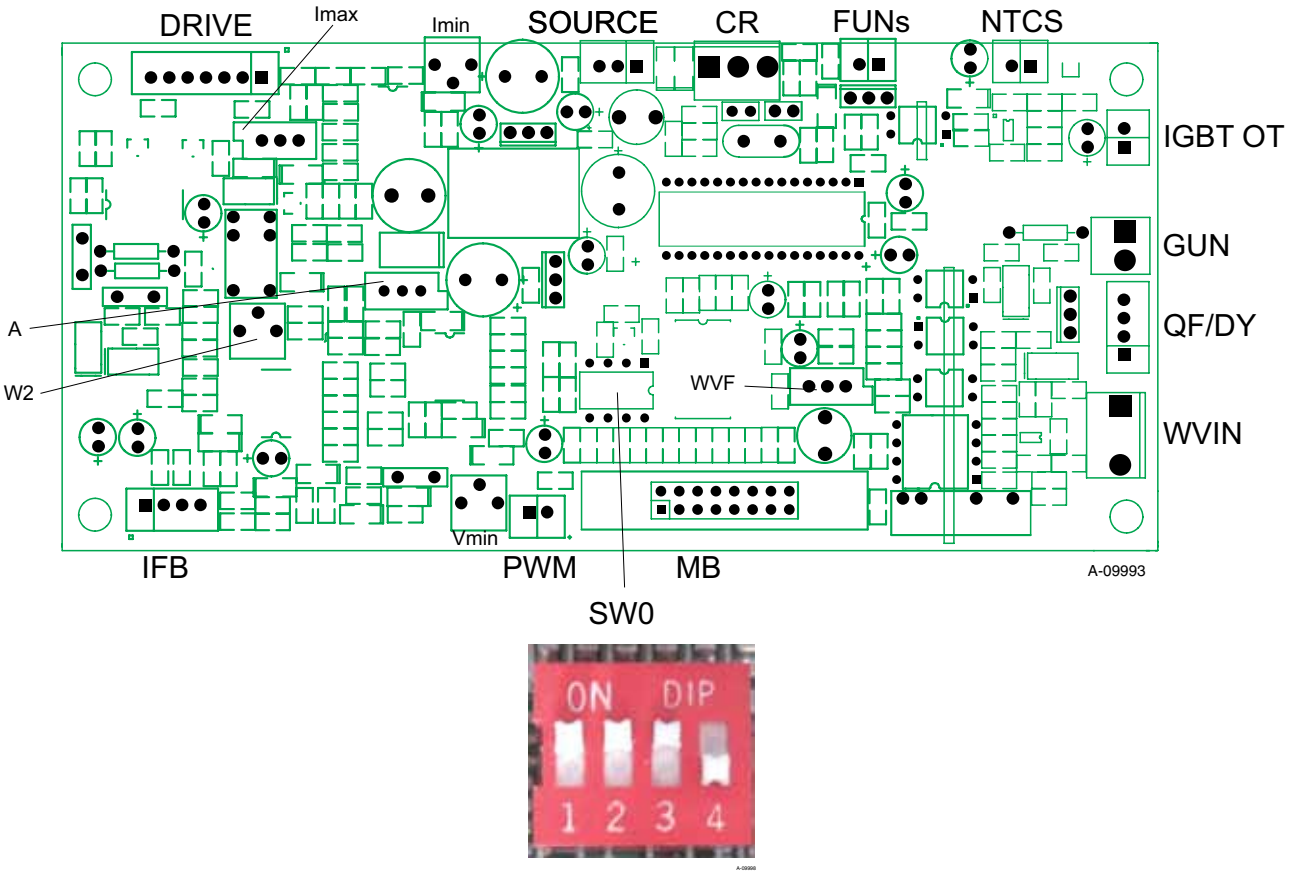
Table 6-35 R-G Header pin function (connects to front panel 8 pin remote socket)

J1 Header Pin	Pin function	Signal
1	Serial display data & eprom (D-IN)	5 VDC digital
2	Serial display data (LOAD)	5 VDC digital
3	Serial display data (CLK)	5 VDC digital
4	2T/4T pushbutton (0V when button pushed)	0VDC
5	Serial display eprom (D-OUT)	5 VDC digital
6	Stick mode (used for remote / local)	
7	Chip select	5 VDC digital
8	MODE pushbutton (0V when button pushed)	0VDC
9	15VDC	15 VDC
10	Remote / Local switch	
11	Inductance pot terminal 2	
12	Volts setpoint	0 – 5 VDC
13	Inductance pot terminal 1	
14	Amps setpoint	0 – 5 VDC
15	5VDC	5 VDC
16	0V	0 VDC

Table 6-36 J1 Header pin function (connects to MB header on control PCB)

6.13 DIP switch settings, Control PCB

1 DIP Switch SW0, control PCB

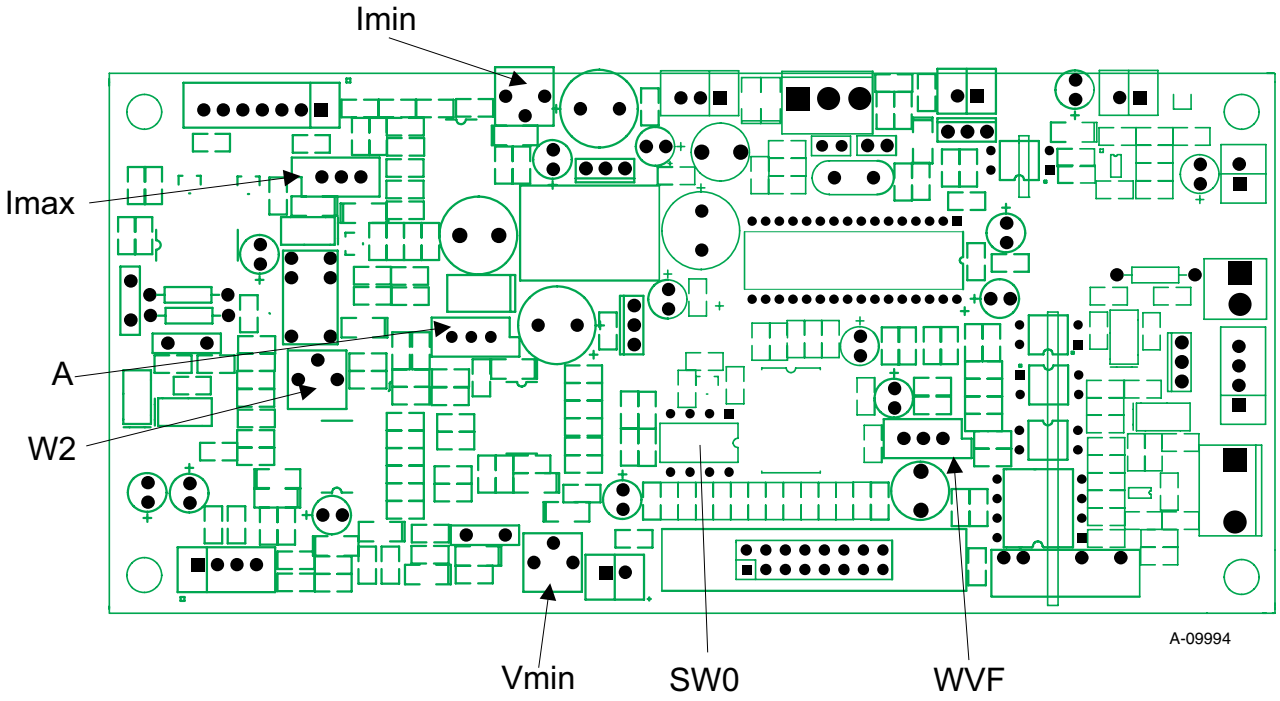


SW0 position	Function
1	Set to OFF for Fabricator 181i
2	Set to ON for Fabricator 181i
3	Set to OFF for Fabricator 181i
4	ON

Table 6-37 SW0 Dip Switch functions

6.14 Calibration

1 Calibration



Set SW0-1 to ON, SW0-1 to ON, SW0-3 to ON, SW0-4 to OFF to allow calibration of output volts & amps, and calibration of wire feed speed.

2 Output Current Calibration

Select STICK mode on the front panel.

Measure no load output welding voltage and adjust WVF potentiometer so Volts display reads within 0.2V of the measured value.

Connect a load to the output terminals. The load should be of a resistance to give 25V at 250A.

Set front panel AMPS potentiometer to minimum.

Adjust Imin trimpot until output amps is 10A +/- 0.2A

Set front panel AMPS potentiometer to maximum.

Adjust Imin trimpot until output amps is 175A +/- 1A

Recheck settings

Set front panel AMPS potentiometer to maximum.

Adjust A potentiometer so Amps display reads within 0.5A of the measured value.

3 Output Voltage Calibration

Select MIG mode on the front panel.

Remove the load from the output terminals.

Set front panel VOLTS potentiometer to minimum.

Adjust Vmin trimpot until output volts is 14.0V +/- 0.2V

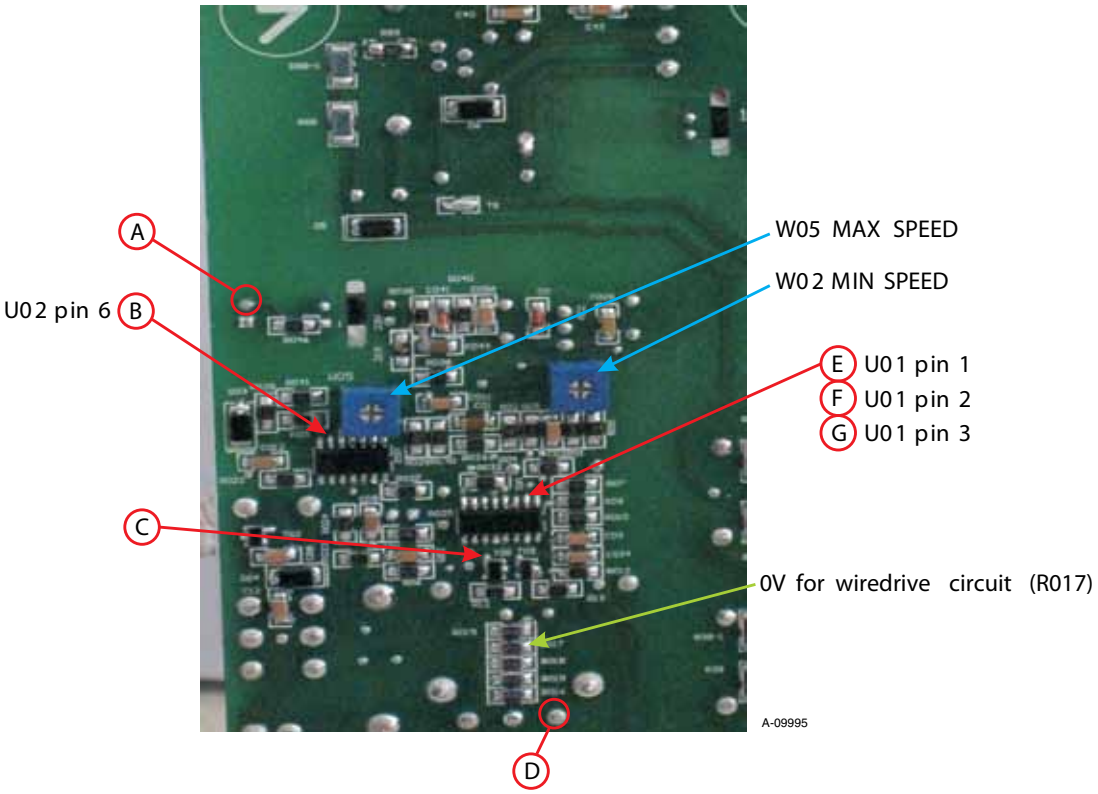
Set front panel VOLTS potentiometer to maximum.

Adjust W2 trimpot until output volts is 25V +/- 0.2V

Recheck settings

4 Wire Speed Calibration

NOTE: these adjustments are on the wiring side of the main inverter module circuit board.



Select MIG mode on the front panel.

Remove the load from the output terminals.

Set front panel WIRESPEED (AMPS) potentiometer to minimum. AMPS display should read “30”

Adjust W02 trimpot until motor volts is 4.2V +/- 0.2V

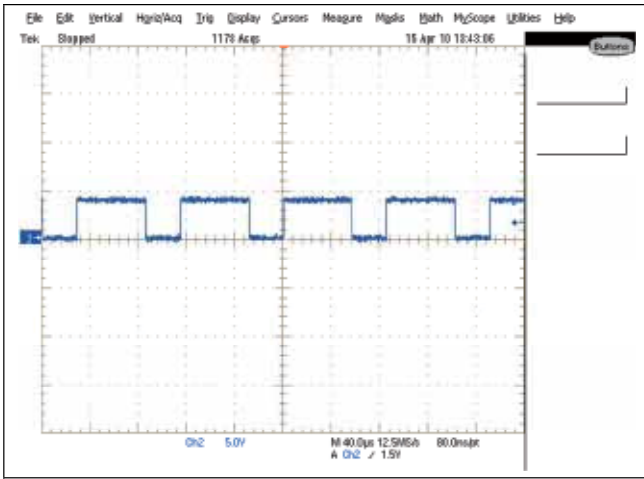
Set front panel WIRESPEED (AMPS) potentiometer to maximum. AMPS display should read “218”

Adjust W05 trimpot until motor volts is 24.7V +/- 0.2V

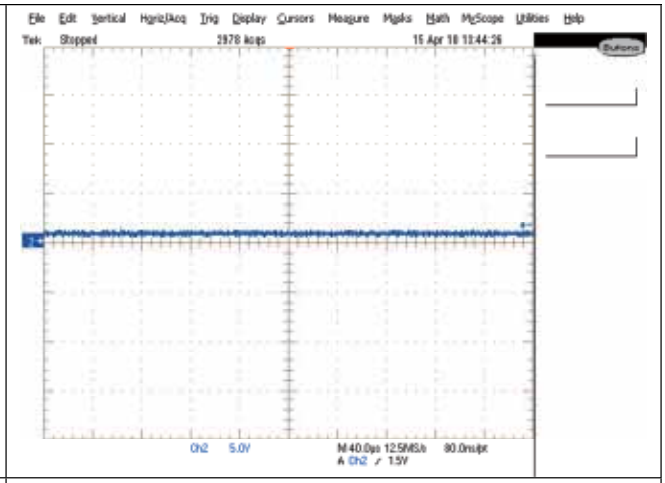
Recheck settings

Set SW0-1 to OFF, SW0-1 to ON, SW0-3 to OFF, SW0-4 to ON to disable calibration of output volts & amps, and calibration of wire feed speed and return to normal operation.

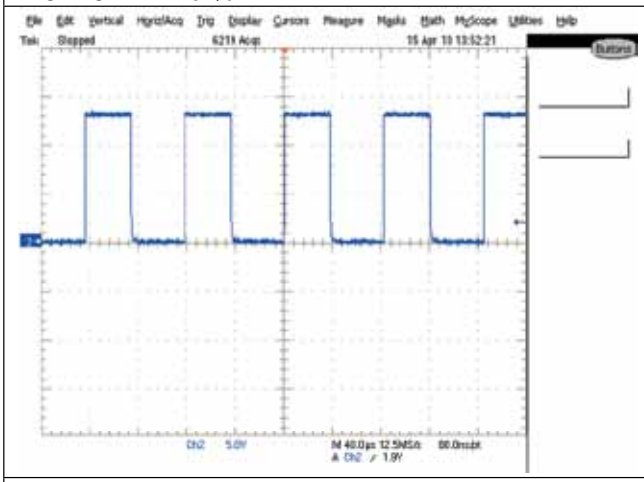
5 Wire Speed Testpoint Waveforms



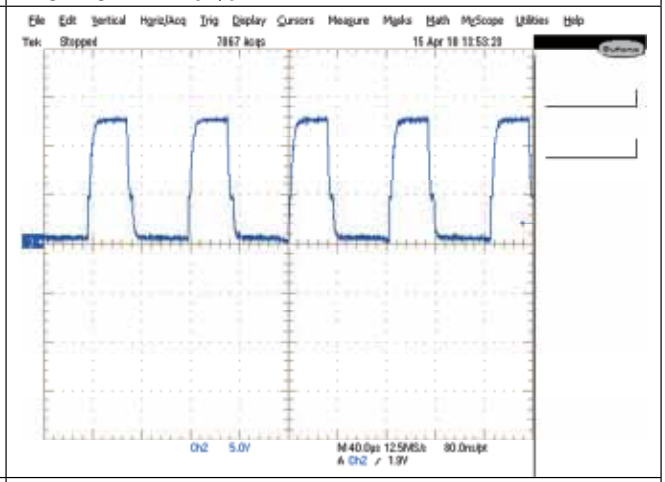
TEST POINT “A” 5V/div



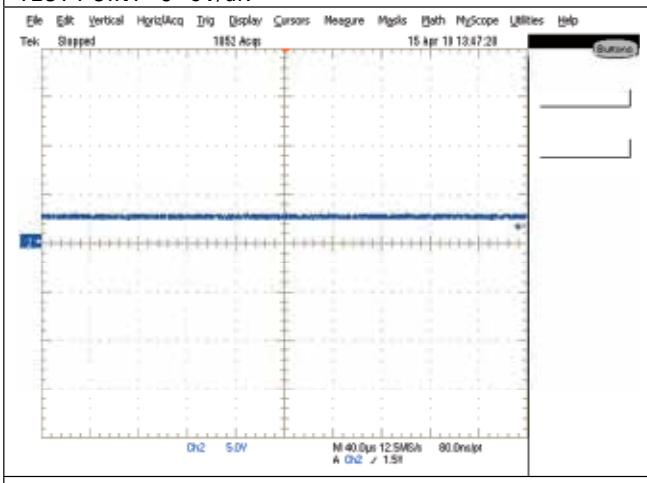
TEST POINT “B” 5V/div



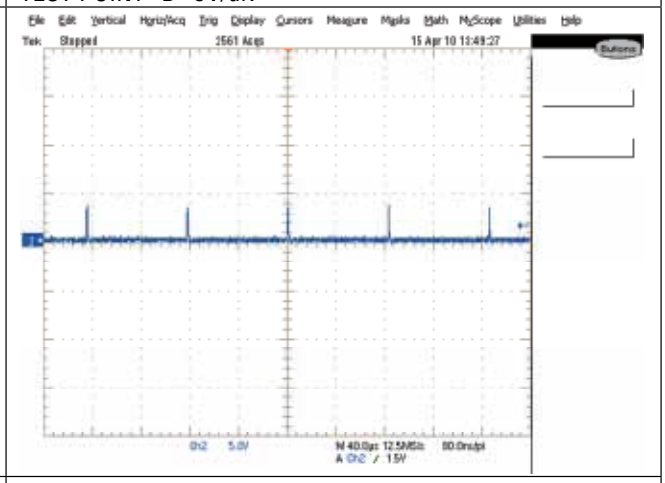
TEST POINT “C” 5V/div



TEST POINT “D” 5V/div



TEST POINT “E” and “F” 5V/div



TEST POINT “G” 5V/div

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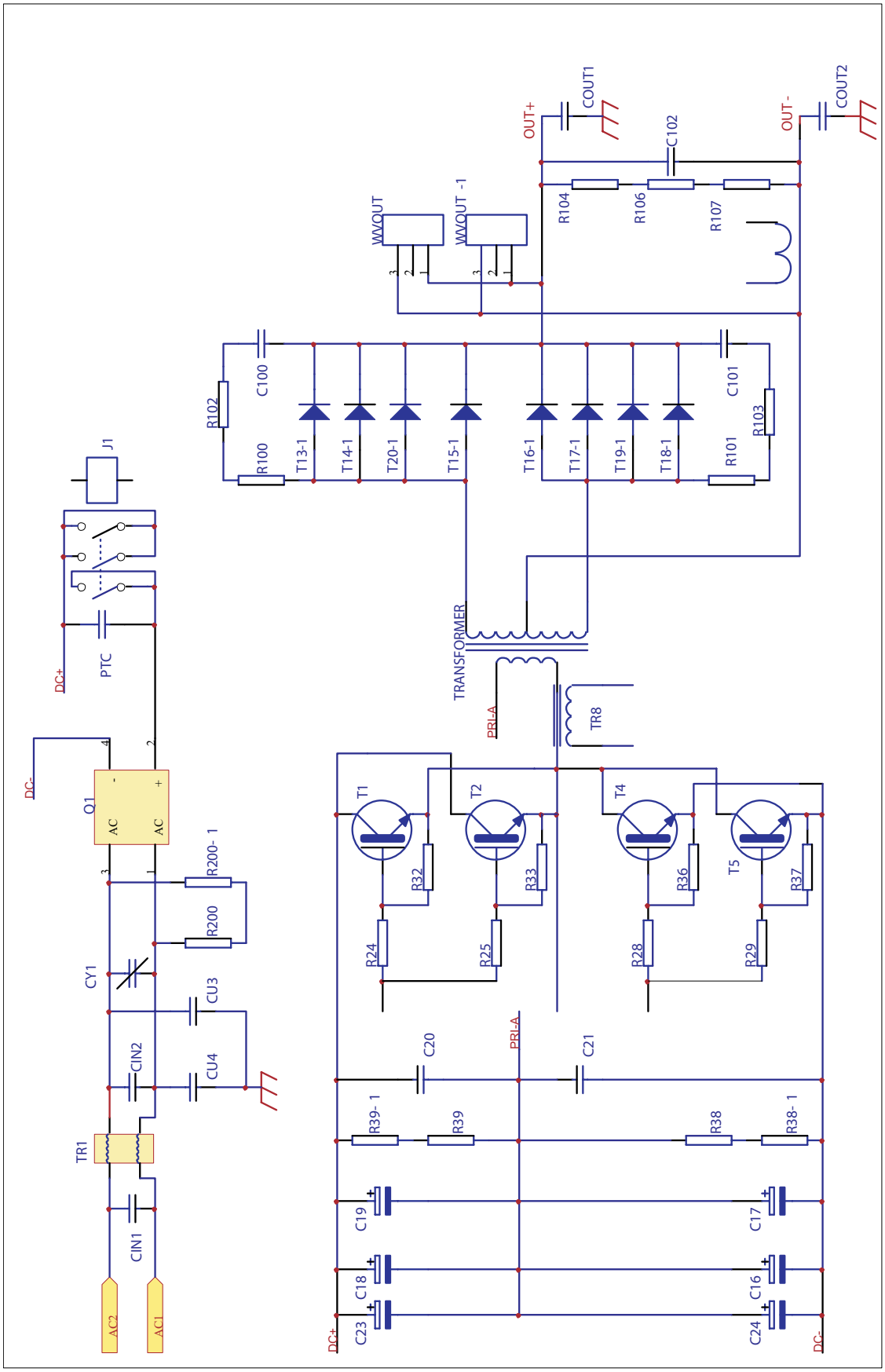
6.15 Main Circuit Description

Turn off power and disconnect mains supply plug from receptacle before working on the unit. Allow two minutes for capacitors to discharge after disconnection from mains supply voltage.



The mains supply voltage is connected via a double pole switch to the input rectifier Q1 through an EMC filter. Overvoltage protection is provided by varistor CY1.

The rectifier output charges the main capacitor bank (C16, C17, C18, C19, C22 and C23) to high voltage. Inrush current limiting is provided by a PTC which is then bypassed by relay J1 after a few seconds.

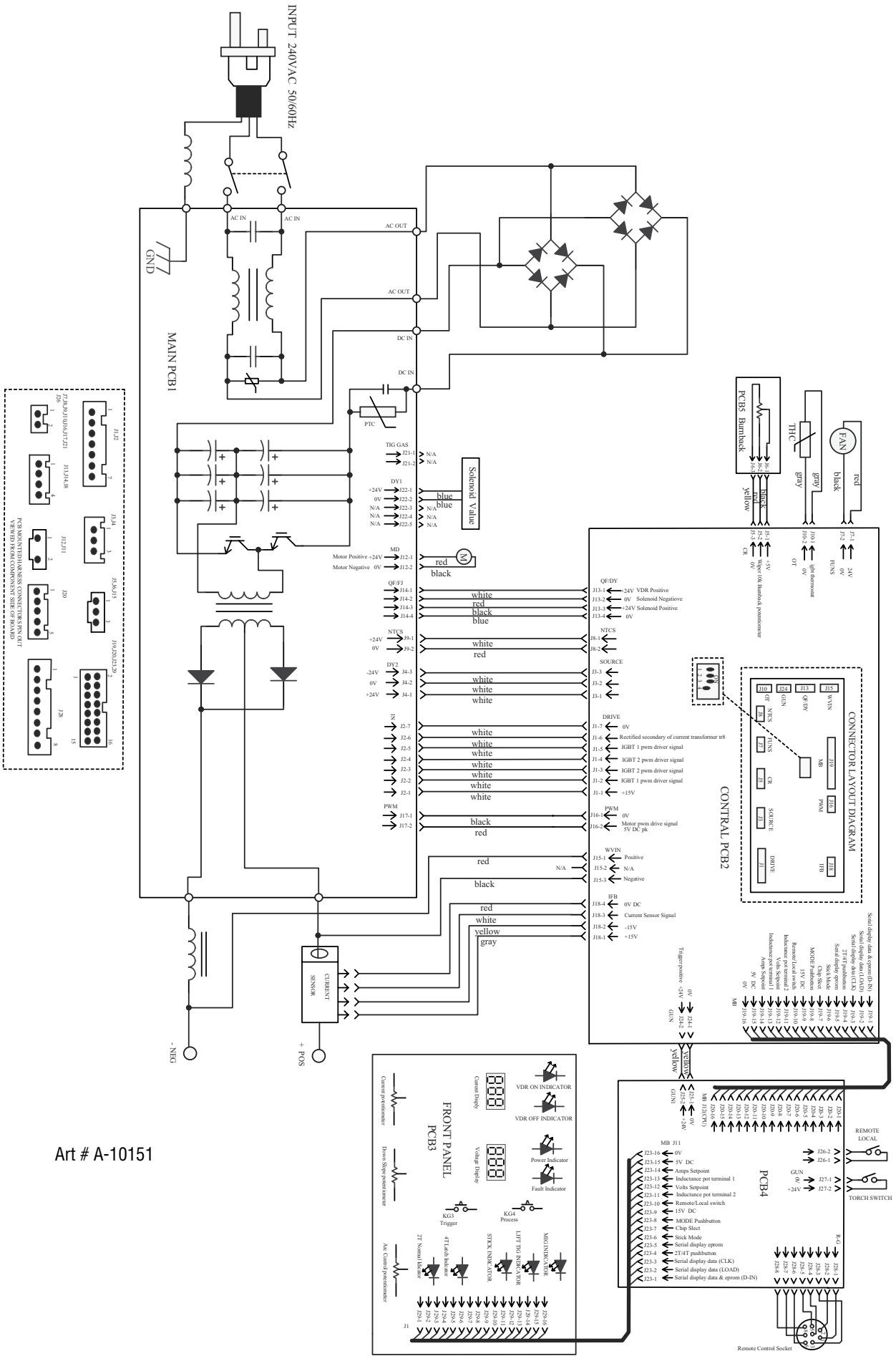
The primary igbt transistors (T1, T2, T4, and T5) switch the transformer primary at high frequency and varying duty cycle. The transformer return wire is taken from the junction of the capacitors C20 and C21 (the voltage at this point is approximately half the DC bus voltage).

Secondary output voltage from the transformer is rectified by the output diodes (T13, T14, T15, T16, T17, T18, T19, and T20) to DC. This DC is controlled by the PWM of the primary side igbt transistors, and is filtered by an inductor before connecting to the welding output terminals.

A thermal overload device (thermistor) is fixed to the rectifier heatsink. When an over temperature occurs, the control circuit inhibits the trigger, gas solenoid, wire drive system and the welding output. The thermal overload indicator LED on the front panel is illuminated.

The current transformer TR8 provides a signal to the control circuit to indicate both transformer primary current, and also detect transformer saturation. The Hall effect current sensor is powered from regulated + & - 15VDC supplies and provides a voltage signal proportional to the output DC welding current to allow the control circuit to regulate welding current.

6.16 Circuit Diagram



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SECTION 7:
DISASSEMBLY PROCEDURE

7.01 Safety Precautions for Disassembly

Read and follow safety information in Section 6.02 before proceeding.

Unplug unit before beginning Disassembly procedure.

7.02 Control Board Removal

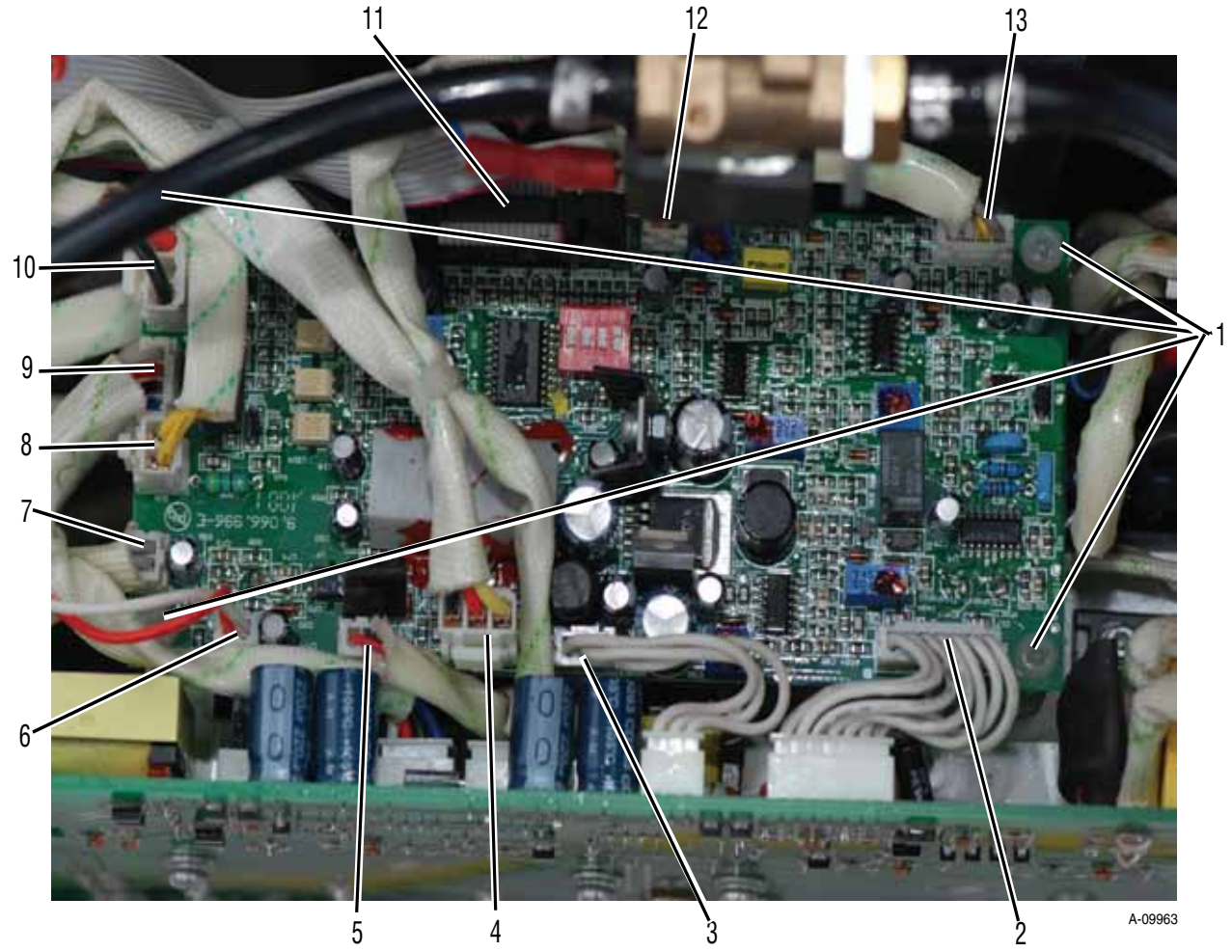
Read and follow safety information in Section 6.02 before proceeding with disassembly

Remove case (refer to 6.04) before remove control board.

Refer to graphics on page 7-3.

1. M4 Screw. Remove 4 screws from Control panel.
2 Disconnect DRIVE harness from DRIVE connector.
3. Disconnect SOURCE harness from SOURCE connector.
4. Disconnect CR harness from CR connector.
5. Disconnect FUNs harness from FUNs connector.
6. Disconnect NTCS harness from NTCS connector.
7. Disconnect IGBT OT harness from IGBT OT connector.
8. Disconnect GUN harness from GUN connector.
9. Disconnect QF/DY harness from QF/DY connector.
10. Disconnect WVIN harness from WVIN connector.
11 Disconnect MB harness from MB connector.
12. Disconnect PWM harness from PWM connector.
13. Disconnect IFB harness from IFB connector.

Ensure to unplug all harness from the main control PCB.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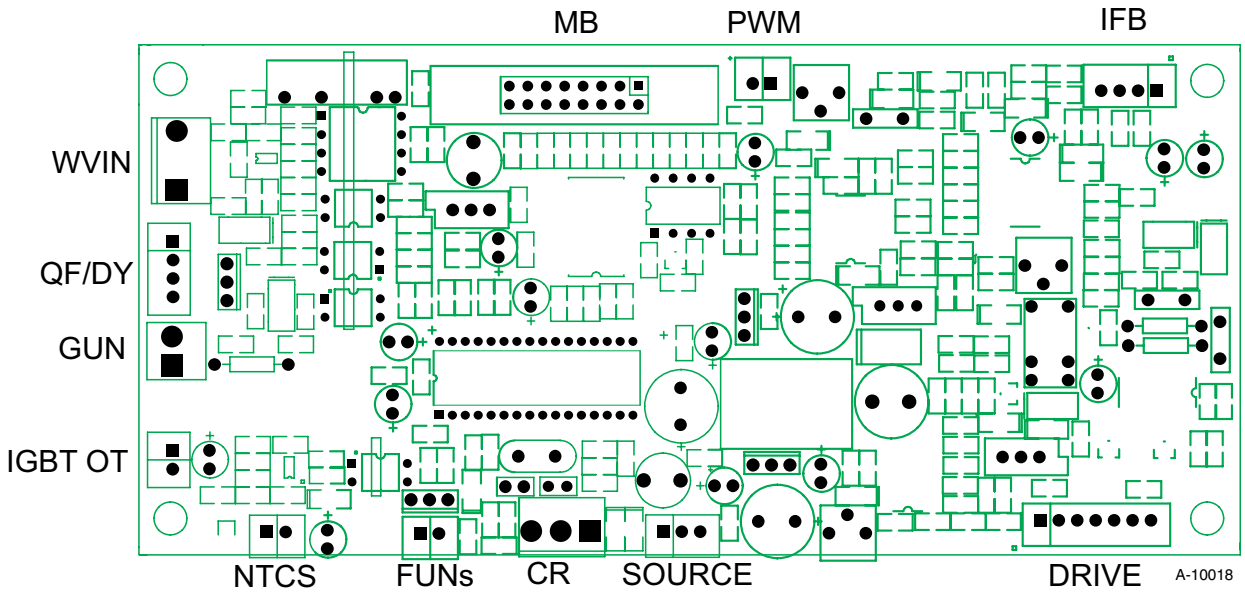
MB
PWM
IFB
WVIN
QF/DY
GUN
IGBT OT
NTCS
FUNs
CR
SOURCE
DRIVE
A-10018

7.03 Front Panel Assembly Removal

Read and follow safety information in Section 6.02 before proceeding with disassembly

1. Screws on front panel
2 Negative output terminal bolts. Unscrew Negative output terminal bolts.
3. Torch cable bolts. Unscrew torch cable terminal bolts.
4. Positive output terminal bolts. Unscrew output terminal bolts.
5. Unplug two red wire harness from PCB as shown in photo on following page.

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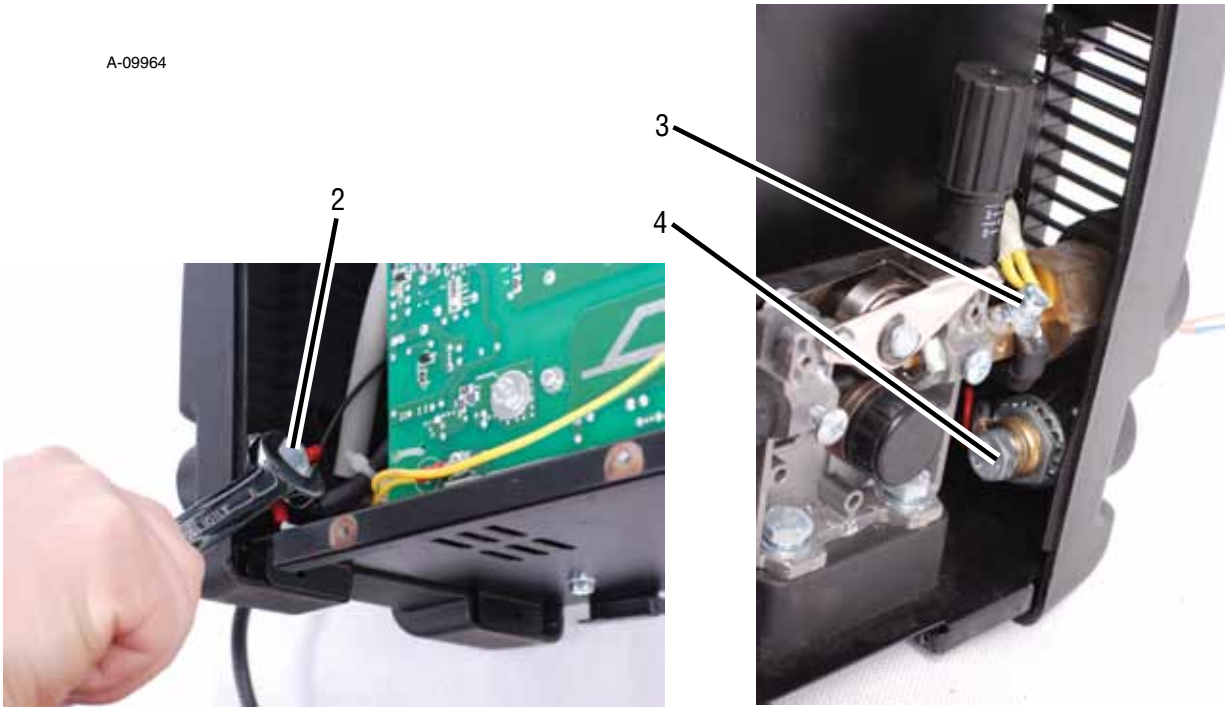

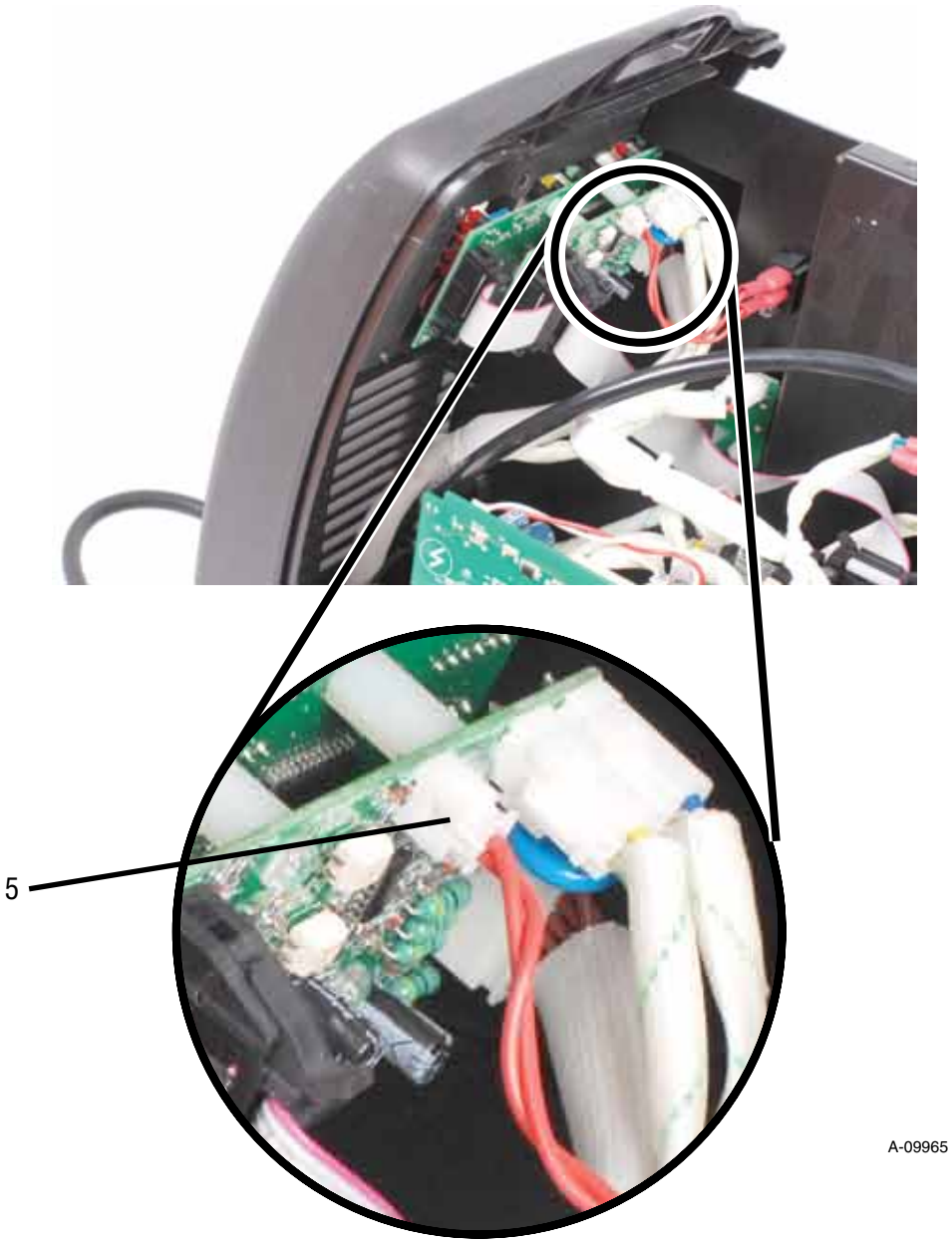
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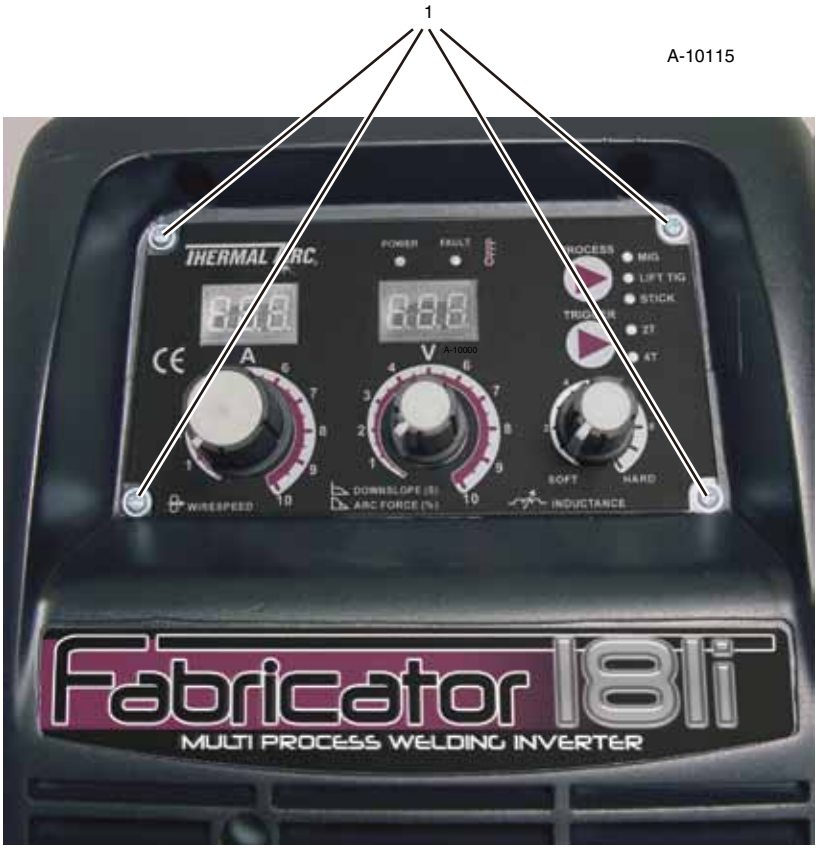
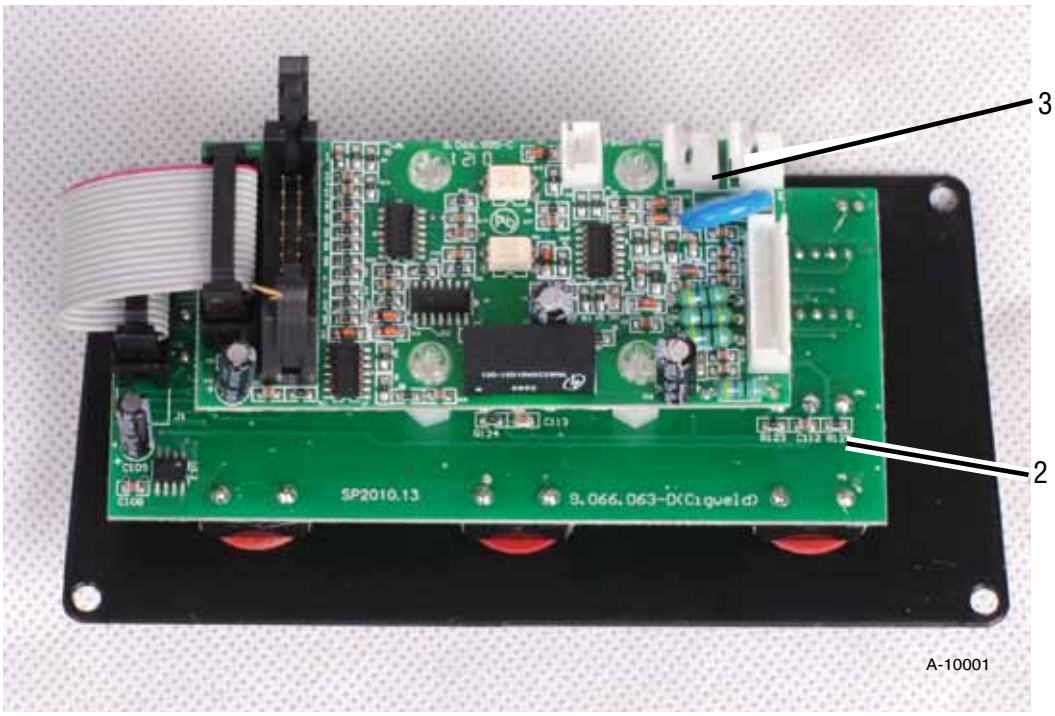
7.04 Front Panel (Operator Interface) Circuit Board PCB3 Removal

Read and follow safety information in Section 6.02 before proceeding with disassembly

1. Remove Control Panel screw (4).
2. Front Panel PCB.
3. Remote control PCB.





7.05 Back Panel Removal

Read and follow safety information in Section 6.02 before proceeding with disassembly

1. ON/OFF switch.

   Ground wire screw.

   Disconnect Input cord ground wire from Main Power PCB1 using a 1/4" wench.

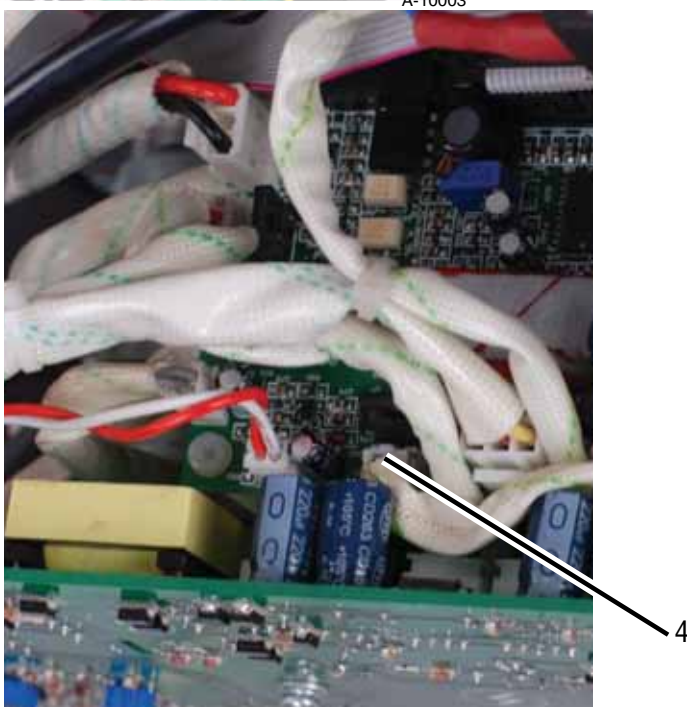
2. Terminal from supply cable. Disconnect two terminals from switch.
3. Wire from Main PCB1.

   Disconnect the two wires from switch.

   Rear panel mounting SCREW.

   Remove screw holding rear panel to chassis.

4. Disconnect harness from J8 connector on Control PCB2 and carefully lift the wire free from the unit.



7.06 Power Switch S1 and Power Cord Removal

Read and follow safety information in Section 6.02 before proceeding with disassembly

1. Gas inlet. Remove gas inlet from rear panel.
2. SW1 locking tabs

   Squeeze the locking tabs and push SW1 out from the rear panel.
3. Strain relief screws

   Remove the two (2) screws from the strain relief.
4. Remove Fan.
5 Input Power Cord ground wire filter.

   Cut the tie-wrap and remove the Ferrite core from the ground wire.
6. Pull the Input Power Cord out. It may be necessary to use a flat blade screw driver against the strain relief tabs, prying outward (Internal side if strain relief) to help remove the cord.

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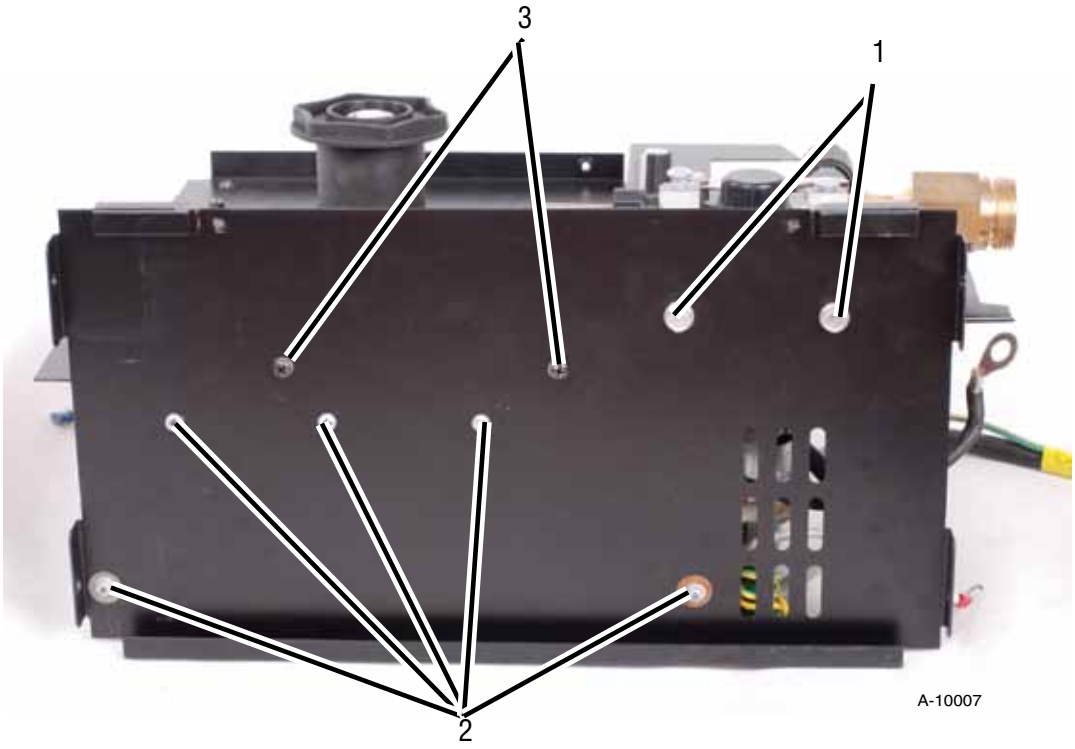
7.07 Base Panel Removal

Read and follow safety information in Section 6.02 before proceeding with disassembly

1. Remove Wire Feeder Screws.
2. Remove Main PCB assembly Screws.
3. Remove Central Panel Screws.

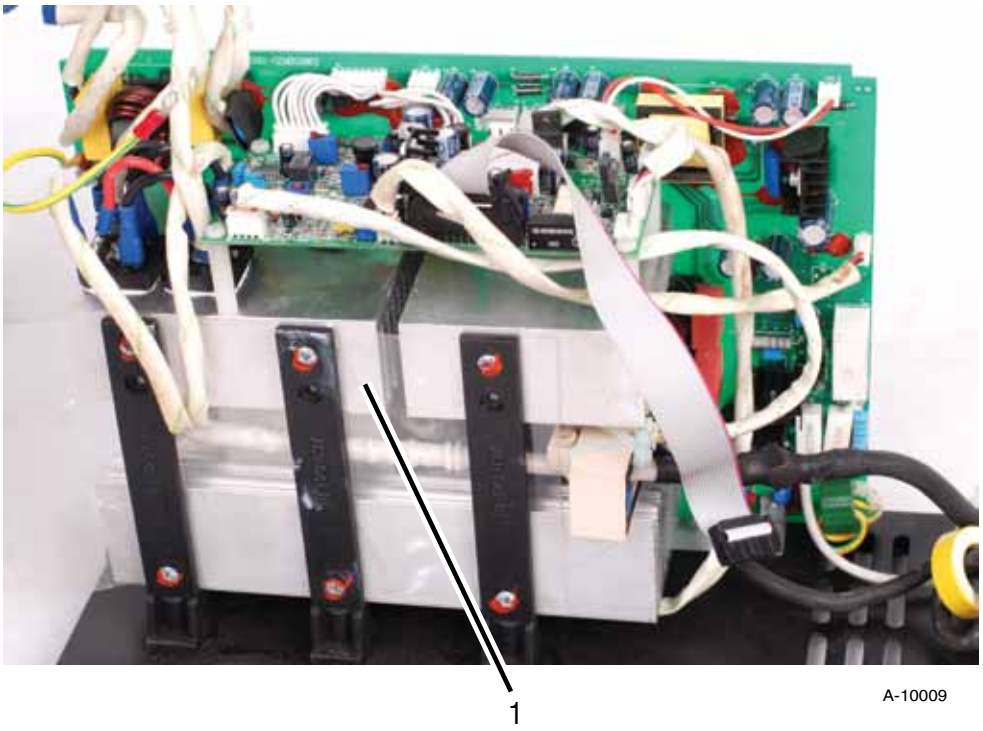


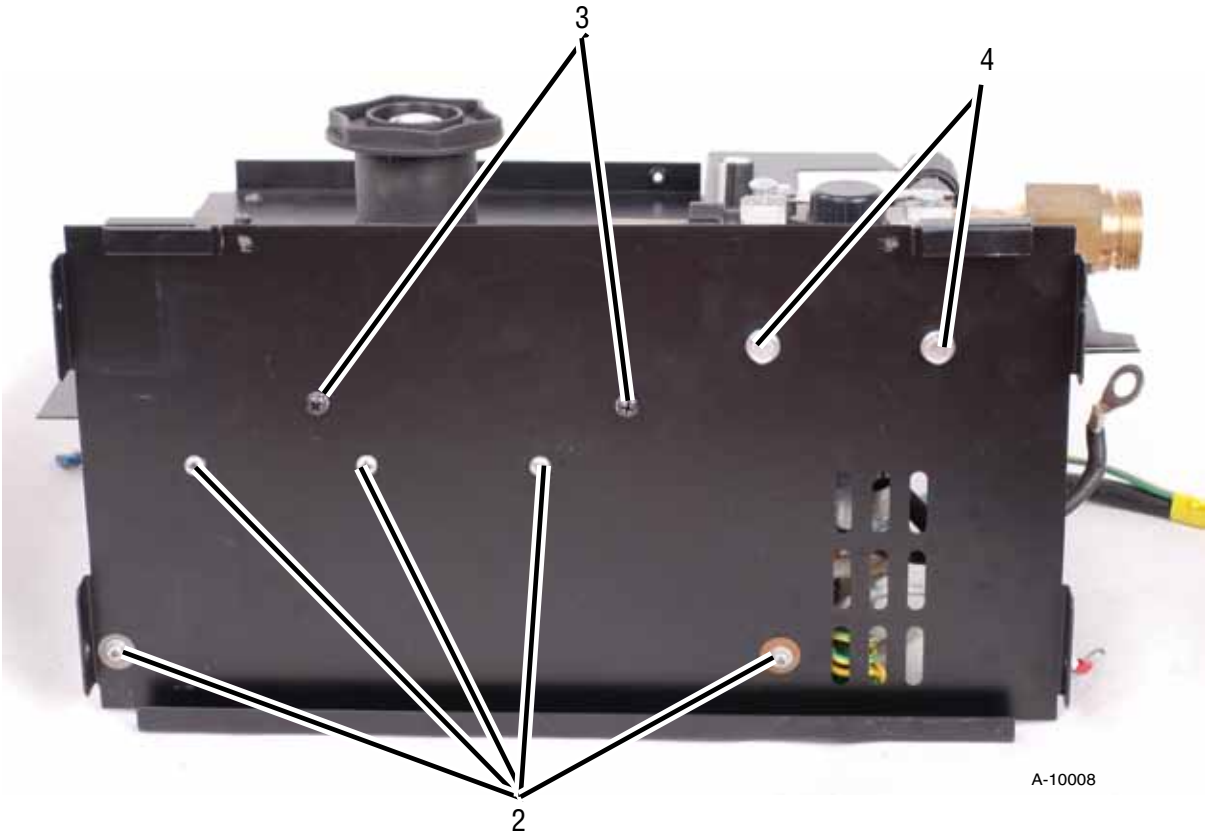
Notes

SECTION 8:
ASSEMBLY PROCEDURES

8.01 Installing Base Board

1. Main Power PCB assembly
2. Install main PCB assembly screws
3. Install central Panel Screws.
4. Install wire feeder.



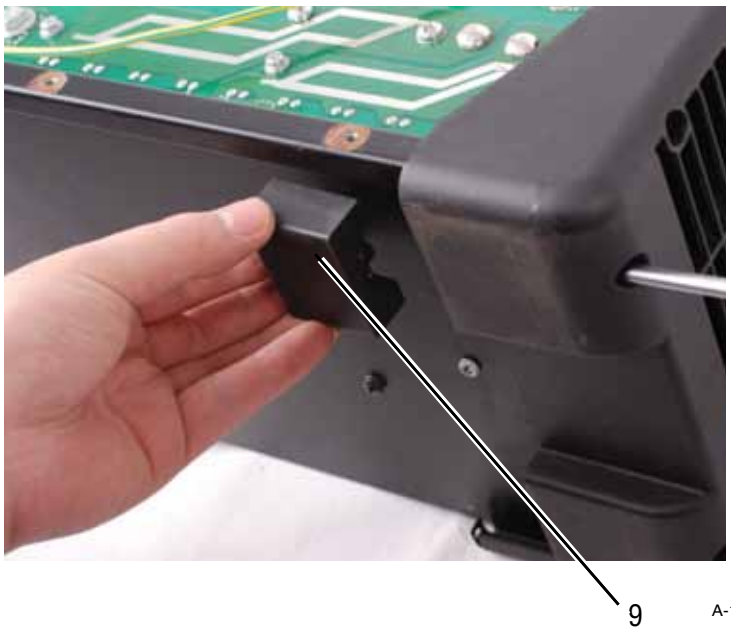


8.02 Installing Back Panel

1. Install gas inlet.
2. Install ON/OFF switch
3. Install wire cord and 2 screws.
4. Reconnect Input Wire on the ON/OFF switch.
5. Reinstall Ferrite core onto Ground Wire.
6. Install fan.
7. Reconnect power ON/OFF switch to terminals on Main Power PCB.
8. Reconnect Ground Wire to filter PCB.
9. Reconnect Rear Panel screws.

A-10116

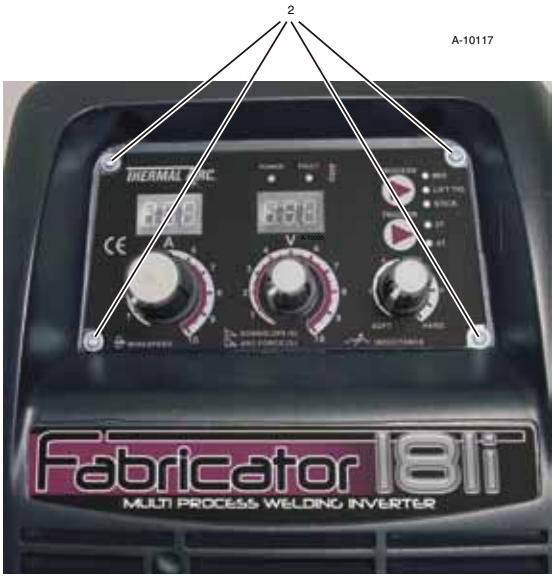
A-10011



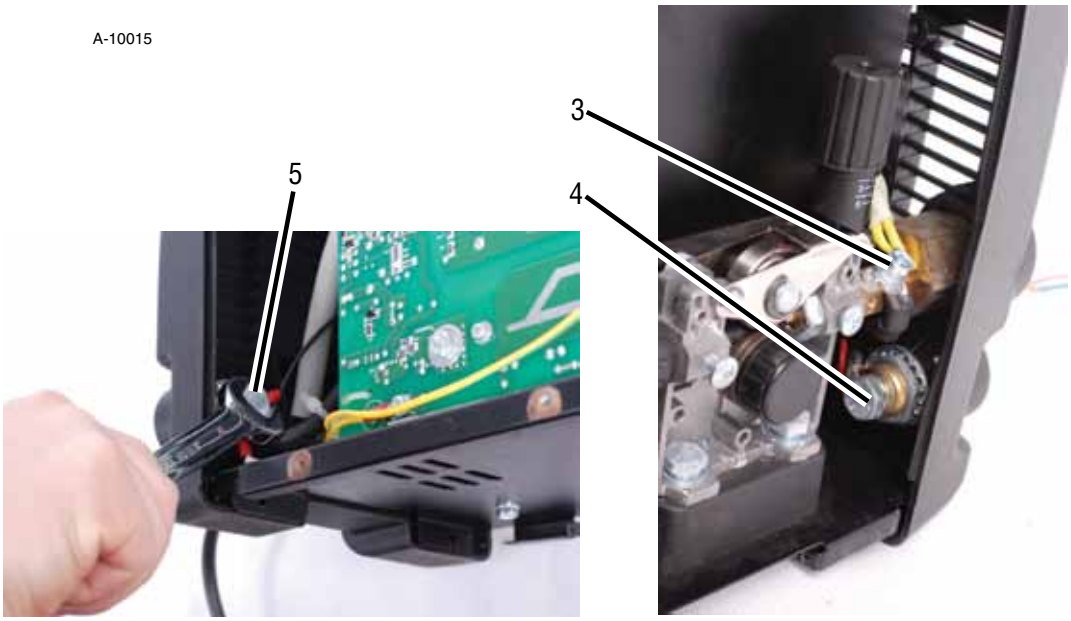
A-10114

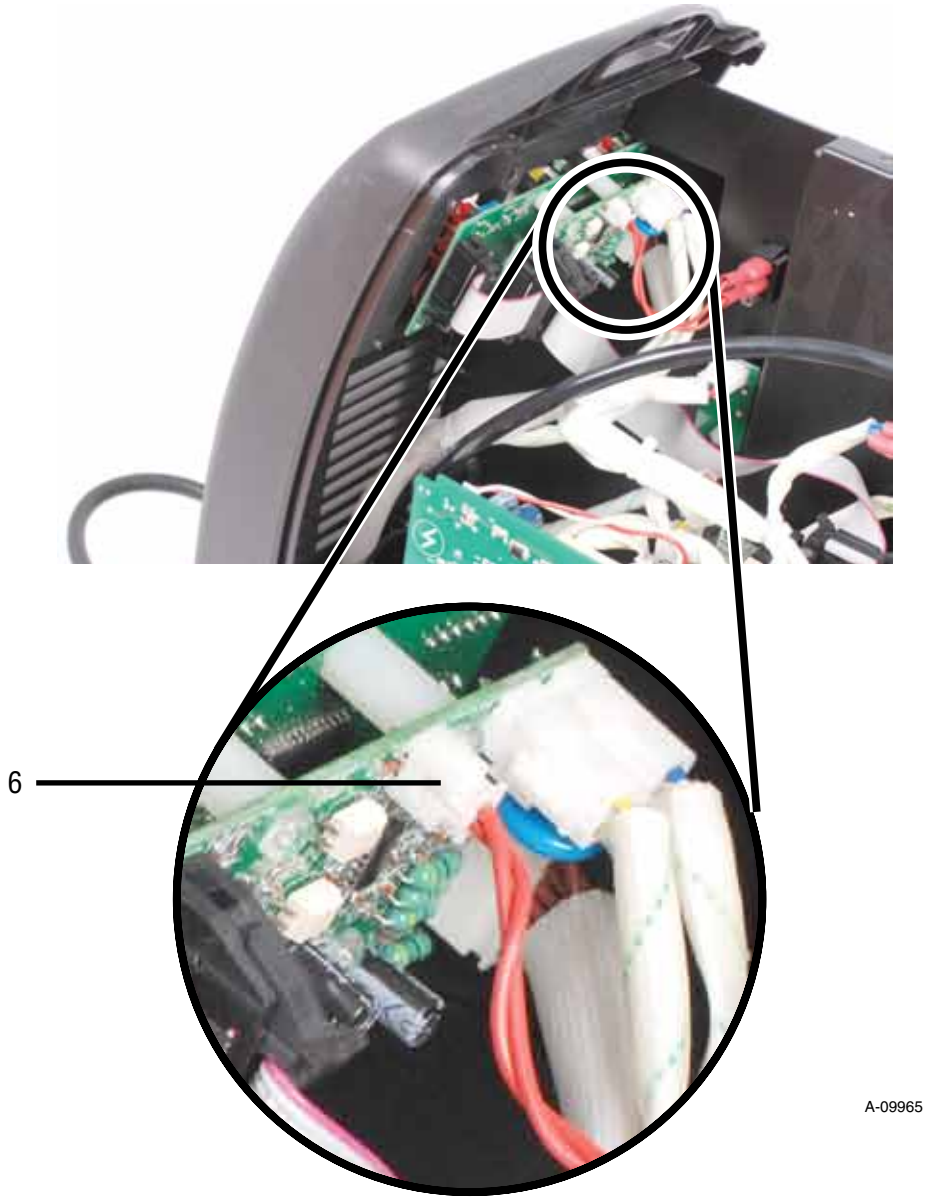
8.03 Installing Front Panel

1. Reinstall output terminals on front panel with 27mm wrench.
2. Place front panel PCB assembly into front panel and install screws.



3. Reconnect torch polarity cable to the torch connector.
4. Reconnect positive output terminal bolts and tighten with 17mm wrench. (Note: reconnect wires, pay attention to the wire colour.)
5. Reconnect negative output terminal bolts and tighten with 17mm wrench. (Note: reconnect wires and pay attention to the wire colour.)
6. Reconnect the red two wired plug into the PCB as shown in the photo on the following page.




6
A-09965

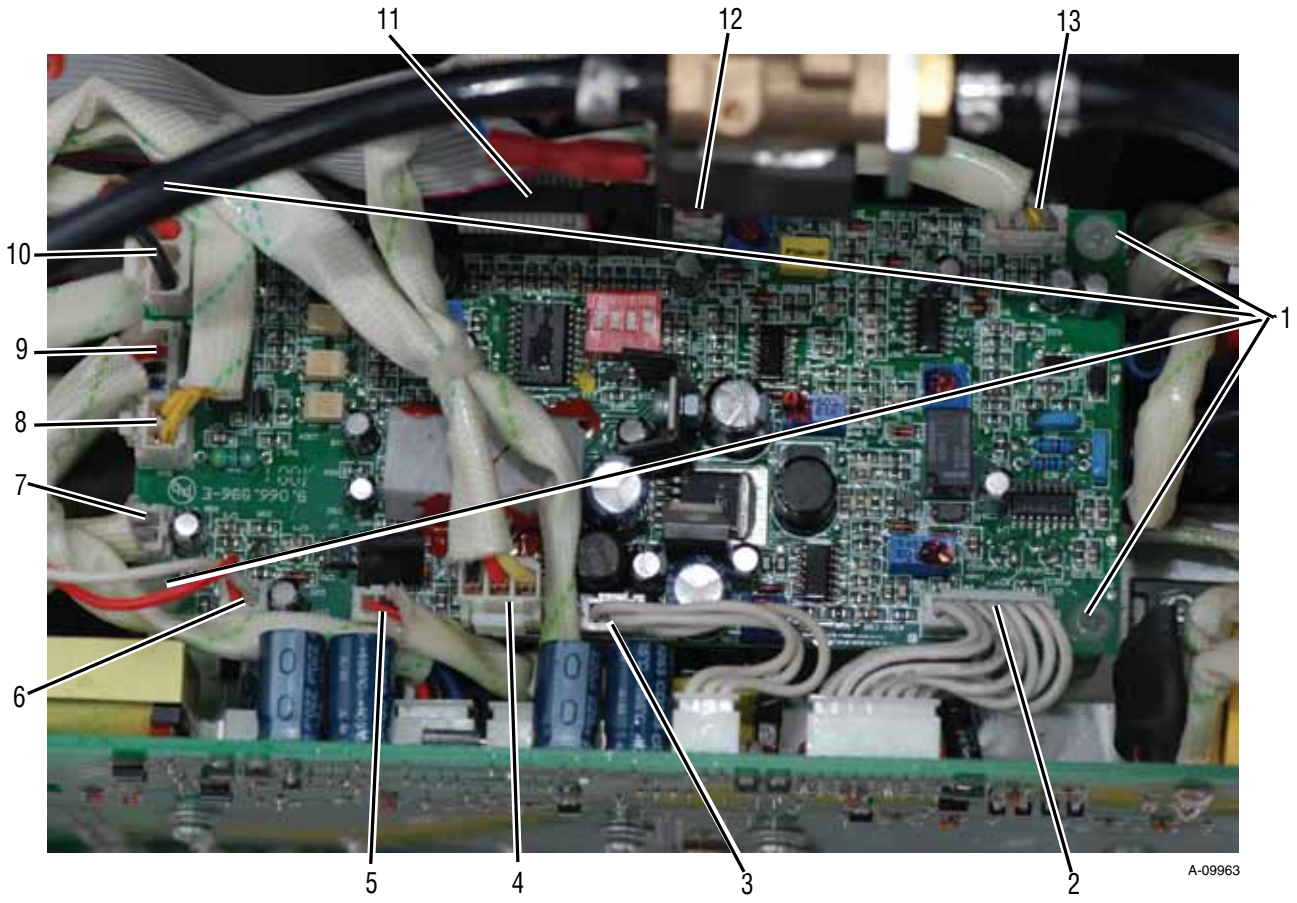
8.04 Installing Main Control Panel and Clear Cover Sheet

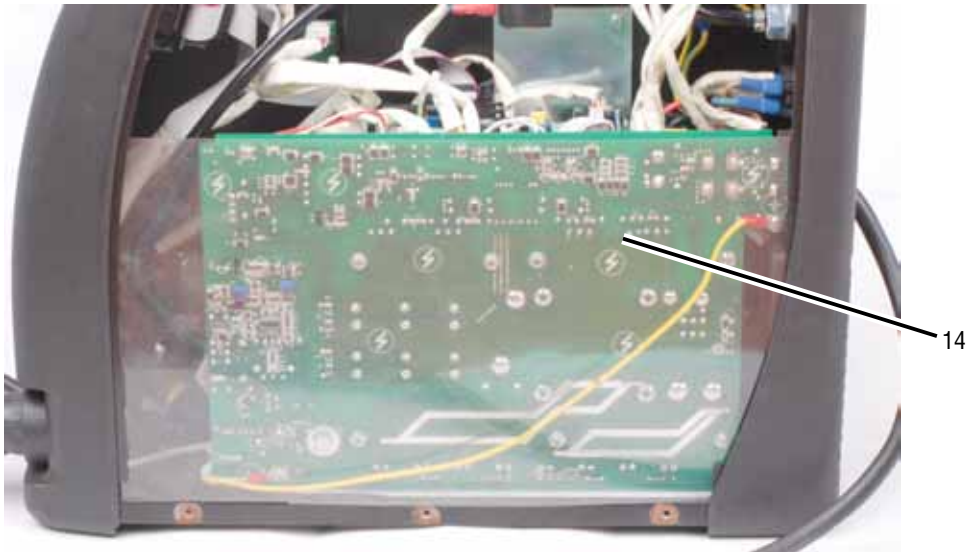
Refer to diagram on page 8-4.

1. Install 4 screws.
2 Plug harness into DRIVE connector.
3. Plug harness into SOURCE connector.
4. Plug harness into CR connector.
5. Plug harness into FUNs connector
6. Plug harness into NTCs connector.
7. Plug harness into IGBT OT connector .
8. Plug harness into GUN connector.
9. Plug harness into QF/DY connector.
10. Plug harness into WVIN connector.
11 Plug harness into MB connector.
12. Plug harness into PWM connector.
13. Plug harness into IFB connector.

Verify harness connections with the system schematic to insure all connections are correct.

14. Install clear protective sheet.

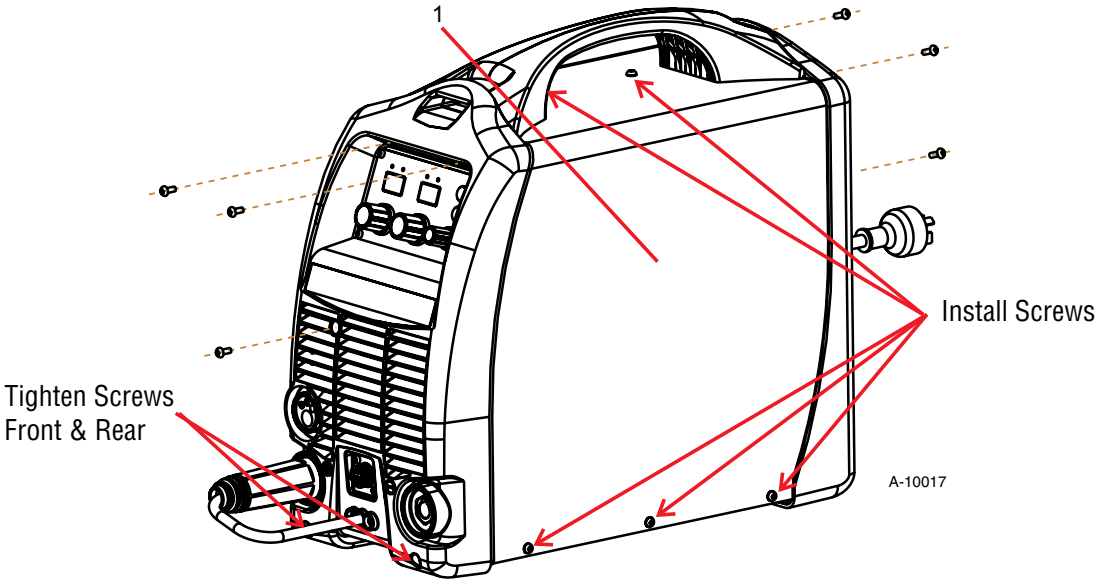


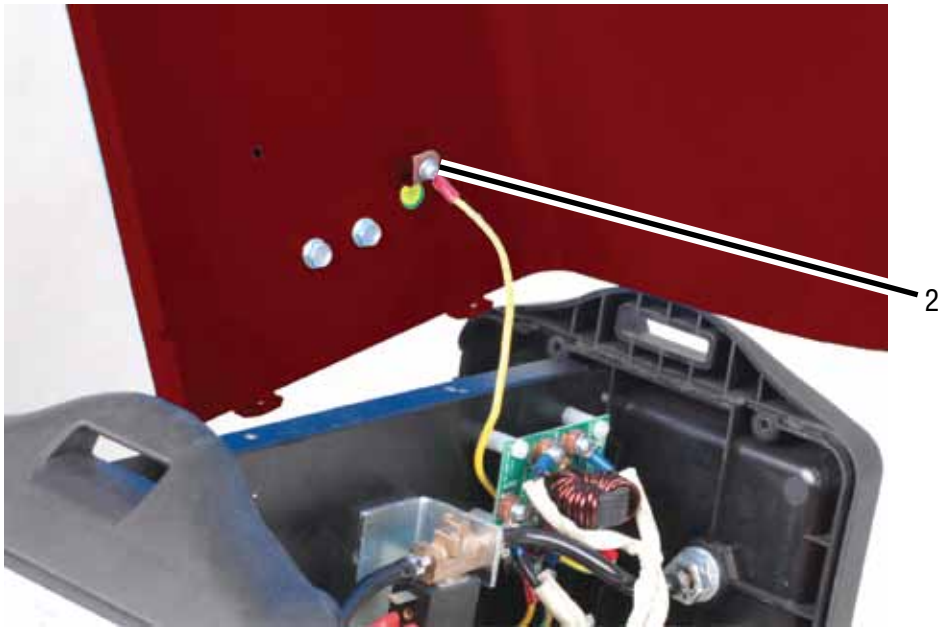


A-10016

8.05 Installing Case

1. Install Case.
2. Install Ground Screw, which connects the ground wire to the cover.
3. Install Screws. Tighten screws.





SECTION 9:
REPLACEMENT PARTS

9.01 Tweco WeldSkill 180A MIG Torch

Torch Part No: WS180XE-10-3035

Torch Parts

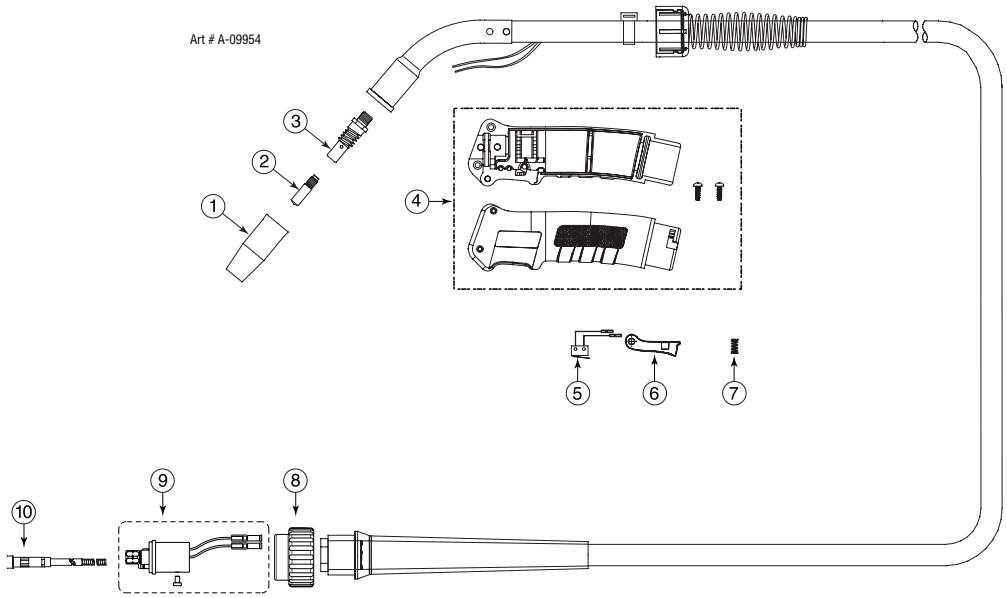


Figure 9-1

TORCH PARTS		
ITEM	**PART NO.**	**DESCRIPTION**
1	WS21-37	Nozzle 10mm
	WS21-50F	Nozzle 13mm
	WS21-62	Nozzle 16mm
2	WS11-23	Contact Tip 0.6mm
	WS11-35	Contact Tip 0.8mm
	11-40	Contact Tip 1.0mm
	WS11-45	Contact Tip 1.2mm
3	WS51	Gas Diffuser
4	WS80-140	Handle with Screws
5	WS90	Microswitch with Lead Wires
6	WS90-LEV	Trigger Lever
7	WS90-LEV-S	Trigger Lever Spring (pkg. 5 each)
8	174X-2	Euro-Kwit Nut
9	174EX-1	Euro-Rear Connector
10	42-23-15	Conductor Assembly (0.6mm Solid Wire Dia)
	WS42-3035-15	Conductor Assembly (0.8-0.9mm Solid Wire Dia)
	WS42N-3545-15	Teflon Conduit Assembly (0.8-1.2mm Al Wire Dia)

Table 9-1

9.02 Power Source

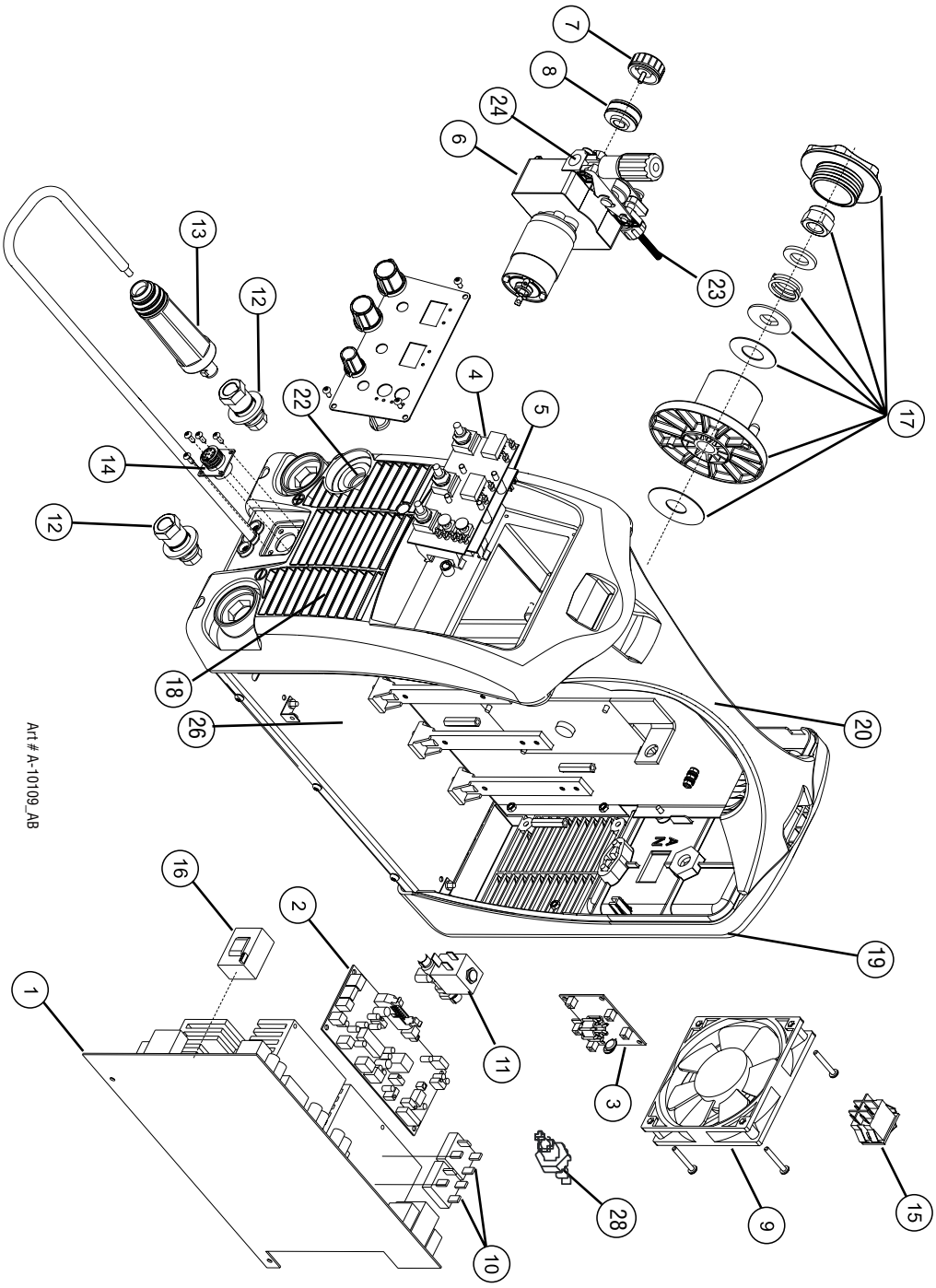


Figure 9-2

FABRICATOR 181i POWER SOURCE SPARE PARTS		
ITEM	**PART NUMBER**	**DESCRIPTION**
1	W7004900	PCB Power
2	W7004901	PCB Control
3	W7004902	PCB EMC Filter
4	W7004903	PCB Front Panel (Display)
5	W7004904	PCB Front Panel (Piggy-Back)
6	W7004905	Wiredrive Assembly
7	W7004906	Feed Roll Retaining Thumbscrew
8	62020	Feed Roll 0.6/0.8mm V groove (fitted as standard) (Refer to options and accessories table for other feed rolls available).
9	W7004907	Fan Assembly
10	W7003010	Input Rectifier
11	W7004908	Gas Solenoid Valve Assembly
12	W7004909	Dinse Socket 50mm²
13	704461	Dinse Plug Male 50mm²
14	W7003036	Control Socket 8 pin (Note that 8 pin control plug part number is UOA706900).
15	W7004910	Input Supply Switch
16	W7004911	CT, Output
17	W7004912	Wire Hub Assembly
18	W7004920	Front Panel
19	W7004921	Rear Panel
20	W7004922	Handle
21	W7004923	Side and Top Panels (not shown)
22	W7004924	Euro Outlet Adaptor
23	W7004925	Inlet Guide
24	W7004926	Outlet Guide
25	W7004927	Door Panel (not shown)
26	W7004928	Base Panel
27	W7004930	Gas Hose Assembly 3/8 BSP
28	W7005605	Gas Inlet Fitting

Table 9-2

Notes

SECTION 10:
OPTIONS AND ACCESSORIES

10.01 Options and Accessories

DESCRIPTION	PART NUMBER
Tweco WeldSkill 180A MIG Torch with 3M lead	WS180XE-10-3035
TIG Torch 17V with 4m lead	310.050.002
Feed Roll 0.6/0.8mm V groove (hard), (fitted)	62020
Feed Roll 0.9/1.2mm V groove (hard)	62022
Feed Roll 0.8/0.9mm U groove (soft)	62179
Feed Roll 1.0/1.2mm U groove (soft)	62024
Feed Roll 0.8/0.9mm V knurled (flux cored)	62028

Table 10-1: Fabricator 181i Options and Accessories List

THERMAL ARC - LIMITED WARRANTY TERMS

LIMITED WARRANTY: Thermal Arc ®, Inc, A Thermadyne Company, hereafter, “Thermal Arc” warrants to customers of its authorized distributors hereafter “Purchaser” that its products will be free of defects in workmanship or material. Should any failure to conform to this warranty appear within the time period applicable to the Thermal Arc products as stated below, Thermal Arc shall, upon notification thereof and substantiation that the product has been stored, installed, operated, and maintained in accordance with Thermal Arc’s specifications, instructions, recommendations and recognized standard industry practice, and not subject to misuse, repair, neglect, alteration, or accident, correct such defects by suitable repair or replacement, at Thermal Arc’s sole option, of any components or parts of the product determined by Thermal Arc to be defective.

THERMAL ARC MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHERS, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

LIMITATION OF LIABILITY: THERMAL ARC SHALL NOT UNDER ANY CIRCUMSTANCES BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, SUCH AS, BUT NOT LIMITED TO, LOST PROFITS AND BUSINESS INTERRUPTION. The remedies of the Purchaser set forth herein are exclusive and the liability of Thermal Arc with respect to any contract, or anything done in connection therewith such as the performance or breach thereof, or from the manufacture, sale, delivery, resale, or use of any goods covered by or furnished by Thermal Arc whether arising out of contract, negligence, strict tort, or under any warranty, or otherwise, shall not, except as expressly provided herein, exceed the price of the goods upon which such liability is based. No employee, agent, or representative of Thermal Arc is authorized to change this warranty in any way or grant any other warranty.

PURCHASER’S RIGHTS UNDER THIS WARRANTY ARE VOID IF REPLACEMENT PARTS OR ACCESSORIES ARE USED WHICH IN THERMAL ARC’S SOLE JUDGEMENT MAY IMPAIR THE SAFETY OR PERFORMANCE OF ANY THERMAL ARC PRODUCT. PURCHASER’S RIGHTS UNDER THIS WARRANTY ARE VOID IF THE PRODUCT IS SOLD TO PURCHASER BY NON-AUTHORIZED PERSONS.

The warranty is effective for the time stated below beginning on the date that the authorized distributor delivers the products to the Purchaser. Notwithstanding the foregoing, in no event shall the warranty period extend more than the time stated plus one year from the date Thermal Arc delivered the product to the authorized distributor.

TERMS OF WARRANTY – JANUARY 2011

In accordance with the warranty periods stated below, Thermadyne guarantees the proposed product to be free from defects in material or workmanship when operated in accordance with the written instructions as defined in this operating manual.

Thermadyne welding products are manufactured for use by commercial and industrial users and trained personnel with experience in the use and maintenance of electrical welding and cutting equipment.

Thermadyne will repair or replace, at its discretion, any warranted parts or components that fail due to defects in material or workmanship within the warranty period. The warranty period begins on the date of sale to the end user.

Thermal Arc Fabricator 181i	
Component	Warranty Period
Power Source	2 Years
MIG Torch, Electrode Holder / Lead & Work Lead	3 Months
MIG Torch Consumables	NIL

If warranty is being sought, Please contact your Thermadyne product supplier for the warranty repair procedure.

Thermadyne warranty will not apply to:

- Equipment that has been modified by any other party other than Thermadyne's own service personnel or with prior written consent obtained from Thermadyne Service Department.
- Equipment that has been used beyond the specifications established in the operating manual.
- Installation not in accordance with the installation/operating manual.
- Any product that has been subjected to abuse, misuse, negligence or accident.
- Failure to clean and maintain (including lack of lubrication, maintenance and protection), the machine as set forth in the operating, installation or service manual.

Within this operating manual are details regarding the maintenance necessary to ensure trouble free operation.

This manual also offers basic troubleshooting, operational and technical details including application usage.

You may also wish to visit our web site www.thermadyne.com select your product class and then select literature. Here you will find documentation including:

- Operator manuals
- Service manuals
- Product guides

Alternatively please contact your Thermadyne distributor and speak with a technical representative.

NOTE

Warranty repairs must be performed by either a Thermadyne Service Centre, a Thermadyne distributor or an Authorised Service Agent approved by the Company.

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